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EUROSYSTEM

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Stability and Security.

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The OeNB's semiannual Financial Stability Report provides regular analyses of Austrian and international developments with an impact on financial stability. In addition, it includes studies offering in-depth insights into specific topics related to financial stability.

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Call for Applications: Visiting Research Program

The Oesterreichische Nationalbank (OeNB) invites applications from external researchers for participation in a Visiting Research Program established by the OeNB's Economic Analysis and Research Department. The purpose of this program is to enhance cooperation with members of academic and research institutions (preferably postdoc) who work in the fields of macroeconomics, international economics or financial economics and/or with a regional focus on Central, Eastern and Southeastern Europe.

The OeNB offers a stimulating and professional research environment in close proximity to the policymaking process. Visiting researchers are expected to collaborate with the OeNB's research staff on a prespecified topic and to participate actively in the department's internal seminars and other research activities. They will be provided with accommodation on demand and will, as a rule, have access to the department's computer resources. Their research output may be published in one of the department's publication outlets or as an OeNB Working Paper. Research visits should ideally last between 3 and 6 months, but timing is flexible.

Applications (in English) should include

- a curriculum vitae,
- a research proposal that motivates and clearly describes the envisaged research project,
- an indication of the period envisaged for the research visit, and
- information on previous scientific work.

Applications for 2013 should be e-mailed to *eva.gehringer-wasserbauer@oenb.at* by May 1, 2013.

Applicants will be notified of the jury's decision by mid-June. The following round of applications will close on November 1, 2013.

Financial stability means that the financial system – financial intermediaries, financial markets and financial infrastructures – is capable of ensuring the efficient allocation of financial resources and fulfilling its key macroeconomic functions even if financial imbalances and shocks occur. Under conditions of financial stability, economic agents have confidence in the banking system and have ready access to financial services, such as payments, lending, deposits and hedging.

Reports

The reports were prepared jointly by the Foreign Research Division, the Economic Analysis Division and the Financial Markets Analysis and Surveillance Division, with contributions by Peter Backé, Gernot Ebner, Maximilian Fandl, Martin Feldkircher, Andreas Greiner, Ulrich Gunter, Gerald Krenn, David Liebeg, Georg Merc, Benjamin Neudorfer, Benedict Schimka, Stefan Schmitz, Josef Schreiner, Maria Silgoner, Tomáš Slačík, Ralph Spitzer, Peter Strobl, Eva Ubl and Walter Waschiczek.

Management Summary

Subdued Economic Growth in the EU and in CESEE

The global recovery lost steam over the first half of 2012. While the outlook for the U.S. and the Chinese economy brightened somewhat after the summer, the recovery in Japan and the euro area was again put on hold. In the U.S.A., domestic demand has been the main engine of economic growth whereas euro area growth has decelerated steadily. The downturn has been driven by a combination of fiscal consolidation and elevated uncertainty among businesses and investors. To improve the situation, a range of comprehensive countermeasures has been launched. The ECB initiated a new government bond purchase program, and the EU put forward proposals for steps toward a single supervisory mechanism (SSM). All these measures together were important elements in contributing to calming the markets.

Developments in CESEE were characterized by ups and downs. While the financial sector started to recover, economic growth in the region slowed down markedly. Due to ongoing fiscal consolidation, subdued labor market conditions, declining real wages and deteriorating sentiment, some countries slipped into technical recession or continued to report contracting economic activity. Budgetary targets had to be adjusted in many CESEE EU countries already in the course of the year as the pace of growth decelerated. Nevertheless, average growth in the region is expected to stay higher than in the euro area.

House prices in CESEE continued to decline, and inflation generally started to pick up in the summer. The situation in the financial markets, however, brightened because improvements in the regulatory framework for the banking sector increased investor confidence. Short-term interbank rates remained broadly stable in most of the CESEE countries. Despite sustained credit growth in most countries, banks were able to reduce their funding gaps. Fears of excessive deleveraging did not materialize but some countries like Hungary were negatively affected by increasing political and economic risks.

Austrian Real Economy Benefits from Low Interest Rates

The Austrian economy slowed down in the course of 2012 against the backdrop of a weakened global economic environment, and corporate profit growth lost momentum. Despite tighter credit standards, which mainly reflected stronger risk differentiation by banks, bank lending to nonfinancial corporations gained momentum. At the same time equity financing almost came to a standstill while bond issues, which were considerably above the average of the previous years, contributed considerably to corporate financing. Lower interest rates reduced new financing costs and the costs of servicing existing debt. As variable rate loans make up an above-average share in total loans to companies in Austria, domestic businesses are considerably more exposed to interest rate risk than their euro area peers.

Austrian households' disposable income increased in 2012 thanks to relatively high wage settlements and lively employment growth and despite inflation acting as a drag on household incomes. Growth in bank lending to households was subdued, while loan conditions remained favorable. Housing loans still grew, albeit at a slower pace. The debt ratio of households in Austria continued to be lower than in the euro area. Low interest rates and a higher

preference for liquidity led to a shift in the maturity structure of new deposits. Inflows were mainly recorded for overnight and short-term deposits.

Austrian Banks Faced with Challenging Market Conditions

Austrian banks strengthened their retail business in recent years, while gradually reducing interbank activities. Concerns about a credit crunch in Austria due to higher capital requirements, strained funding markets or deteriorating asset quality have not materialized so far. Neither was there widespread deleveraging by Austrian banks in CESEE as the overall exposure to the region increased. Yet data indicate significant differences at the country level, especially for countries with a challenging economic and/or macroeconomic environment. Claims on euro area countries with high risk premiums continued to decline from already comparatively low levels.

The stock of foreign currency loans in Austria has been on a steady decline since autumn 2008, and new foreign-currency lending has almost come to a halt. In CESEE, the share of foreign currency lending in total lending has started to decline slowly, but the outstanding amount continues to be a challenge to borrowers and a potential burden on banks' future profitability.

The profitability of the Austrian banking sector improved considerably in the first half of 2012 compared with 2011. However, net profits were upward-biased because of extraordinary revenues related to capital buyback measures. Risk provisions were almost 10% lower compared with the previous year, but they still remained well above pre-crisis levels. In the first half of 2012 the CESEE business of Austrian banks was again a major source of revenue and growth. The stock of foreign currency loans remained high but loan-to-deposit ratios continued to decline.

Although Austrian credit institutions continued to increase their aggregate core capital ratio in the first half of 2012 by a mixture of retained earnings, buybacks of hybrid capital and reductions in risk-weighted assets, the gap in terms of capital ratios between Austrian banks and other international banks active in CESEE remained. Given the higher credit risk in CESEE, Austrian banks should seek to further increase their risk-bearing capacity and catch up with their peers in this respect.

Nonbank financial intermediaries also faced a challenging market environment in 2012. Life insurers and pension funds were beginning to feel the negative effects of the low interest environment and the resulting decline in investment earnings. The implications of the financial and economic crisis and related investor restraint have led to a reduction of assets under management by Austrian mutual funds.

Action Recommended by the OeNB

Considering all these aspects, the OeNB reiterates its recommendations for strengthening financial stability as published in its Financial Stability Report 23, namely to improve banks' capital situation further and to take steps aimed at ensuring a more balanced and sustainable refinancing of subsidiaries (which are two pillars of the sustainability package adopted by the OeNB and the FMA in March 2012) and to rein in new unhedged foreign currency lending in Austria and CESEE.

International Macroeconomic Environment: Subdued Economic Growth as External Environment Worsens

Advanced Economies: Diverging Developments

Muted growth of the U.S. economy

The global recovery lost steam over the first half of 2012. GDP growth rates slowed down further in the major economies in the second quarter. After the summer, however, the outlook for the U.S. and the Chinese economy brightened somewhat while the recovery in Japan and the euro area was again put on hold. At the same time, the risks to growth remained elevated and tilted to the downside.

In the U.S.A., domestic demand has been the main engine of economic growth. Private consumption was supported by positive signals from the labor and housing markets. More recently, leading indicators pointed also toward increased business confidence. According to the recent forecast of the European Commission, the U.S. economy is set to expand by 2.1% in 2012 and by 2.3% in 2013. Monetary policy has remained expansive at a policy rate of 0% to 0.25%. In September the Board of Governors of the Federal Reserve System (Fed) announced its third round of quantitative easing (QE3). Markets expect that the Fed will buy up to USD 600 billion of mortgage-backed securities. At the beginning of 2013, major tax cuts are set to expire, and government expenditure cuts will take effect. Without a political agreement, the U.S.A. may slip back into recession in 2013, according to the Congressional Budget Office (CBO).

Financial tensions in the euro area ease

Since the end of 2011 euro area growth has decelerated steadily. After zero growth in the first quarter of 2012 real GDP decreased in the second and in the third quarters (quarter on quarter). The downturn has been driven by a combination of fiscal consolidation and elevated uncertainty among businesses and investors, both weighing on domestic demand. The majority of business and consumer confidence indicators points toward a further economic weakening and a recovery no earlier than the first half of 2013. The European Commission expects moderate growth of only 0.1% in 2013. At the same time developments within the euro area have remained quite heterogeneous. Real GDP dropped substantially in Spain and Italy whereas growth was still positive in Germany, where it is also expected to lose momentum, however. Inflation in the euro area has remained elevated, driven by unprocessed food and oil prices.

Throughout 2012 the euro area suffered from increased financial fragility. According to the IMF, funds worth 15% of GDP were withdrawn from Italy and funds worth 27% of GDP from Spain between mid-2011 and mid-2012. In July 2012, the Governing Council of the ECB cut its key interest rates by 25 basis points, bringing the interest rate on main refinancing operations to a historical low of 0.75%. In early September 2012, the ECB initiated a new government bond purchase program termed Outright Monetary Transactions (OMTs) program, under which the Eurosystem may make secondary market purchases (limited neither by volume nor by time) of sovereign bonds issued by countries that are eligible and have applied for support under the European Financial Stability Facility/European Stability Mechanism (ESM). Together with the envisaged steps toward a single supervisory mechanism (SSM), this measure is an impor-

tant element in calming the markets and thus in contributing to a prospective resolution of the government debt crisis. After the announcement of the OMTs program, risk spreads for government bonds narrowed considerably, especially for short maturities. This, in turn, has supported the functioning of the monetary transmission mechanism. For monetary policy to be effective it is essential that interest rate cuts actually feed through to retail lending conditions, which are often linked to bond yields.

The Swiss National Bank (SNB) has remained committed to its exchange rate ceiling of CHF 1.20 per euro. The SNB established this cap in September 2011 in the wake of a new wave of capital inflows triggered by increasing uncertainty in the euro area in spring 2011. The necessary exchange rate interventions by the SNB inflated its foreign exchange reserves and, consequently, its balance sheet risks.

SNB defends exchange rate ceiling

CESEE: Recovery in Financial Markets Contrasts with Subdued Profitability in the Banking Sector and Deteriorating Real Economy

Growth Decelerates Further as External Positions Improve and Price Pressures Increase

Economic growth in the CESEE region[1] slowed down markedly in the first half of 2012. Average annual growth declined from its peak of 4.4% in the third quarter of 2011 to 2.7% in the second quarter of 2012. Some countries even slipped into technical recession (Czech Republic, Hungary) or continued to report contracting economic activity (Croatia). It needs to be noted, however, that despite a deceleration, growth remained comparatively solid at around 3% and above in some other countries (Slovakia, Russia).[2]

Economic dynamics in most countries were increasingly driven by net exports, which constituted the only component contributing positively to growth in Slovakia, the Czech Republic, Hungary and Croatia. Although losing some steam, export growth remained in positive territory, while imports stagnated or even declined against the background of anemic domestic demand in these countries. Domestic demand growth in these countries was held back by weak or even negative credit growth, ongoing fiscal consolidation, below-average capacity utilization, subdued labor market conditions, declining real wages and deteriorating sentiment. Contrary to that, private consumption continued to be a noticeable driving force of growth in Ukraine and Russia and as of late also in Bulgaria. In these countries consumption benefited from more dynamic real wage growth as above-average (in cases substantial) nominal wage increases were coupled with moderating price pressure in the first half of 2012. Capital formation was the most important component of growth only in Romania, where construction activity boosted investment.

According to the current OeNB and BOFIT (Bank of Finland Institute for Economies in Transition) outlook for selected CESEE countries,[3] average

[1] *The CESEE region comprises Bulgaria, Croatia, the Czech Republic, Hungary, Poland, Russia, Romania, Slovakia and Ukraine.*

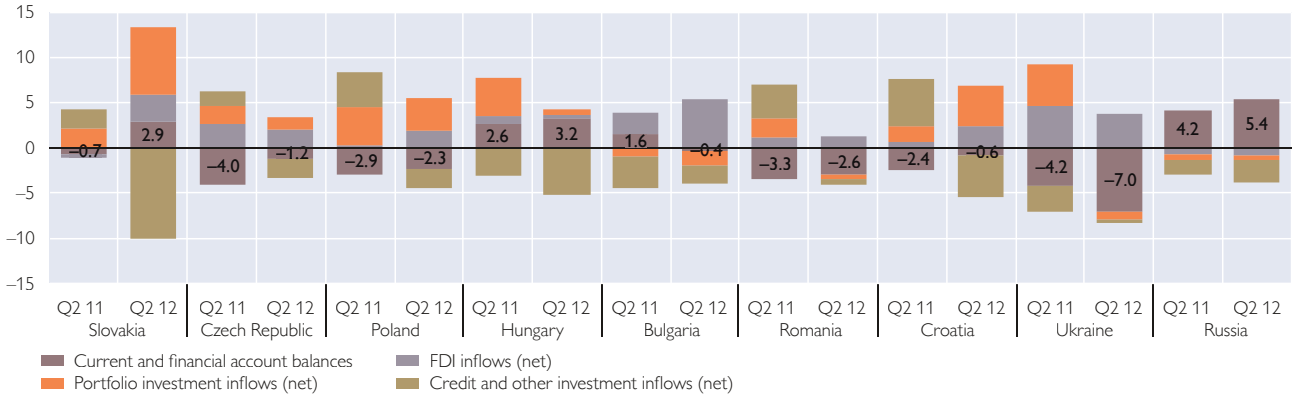
[2] *Flash estimates for growth in the third quarter available by the cutoff date point toward a further weakening of economic dynamics.*

[3] *See Outlook for Selected CESEE Countries: Renewed Slowdown Followed by Modest Recovery. In: Focus on European Economic Integration Q4/12. OeNB. 38–46. The group of countries included in the OeNB-BOFIT Outlook comprises Bulgaria, the Czech Republic, Hungary, Poland, Romania, Croatia and Russia.*

Chart 1

Current and Financial Account Balances and Their Financing

Moving sum of four quarters in % of GDP of this rolling period



Source: Eurostat, national central banks, OeNB.

growth in the region will amount to some 2.6% in 2012 before accelerating to 3.0% in 2013. Regional growth momentum will be fueled primarily by Russia, whose economy will expand at an above-average rate in both 2012 and 2013. This compares with growth prospects of 0.1% and 1.4% for the euro area in 2012 and 2013 (according to the European Commission's autumn forecast).

Current account positions continue to improve in many CESEE countries

The international financial crisis triggered a marked reduction in external imbalances (combined current and capital account balances) in the CESEE region from 2009 onward. In most CESEE countries (e.g. Slovakia, the Czech Republic, Poland, Hungary, Romania, Croatia and Russia), this trend continued in the first half of 2012 (chart 1). Especially trade balances improved in many countries. A smaller deficit in the income account of the Czech Republic and a higher surplus in Romania's capital account, however, played a role too. Only Bulgaria and Ukraine saw their external accounts deteriorating as trade deficits trended upward. In both countries this was related to strong consumption growth. In Ukraine, a weakening of price competitiveness, given the hryvnia's quasi-peg to the U.S. dollar, which recently appreciated against the currencies of most of Ukraine's trading partners, may have also contributed to this development.

The financial account was positive or balanced in most countries under review in the first half of 2012. Only Russia and Hungary reported a deficit (both countries had a current account surplus, however). In Bulgaria, the Czech Republic, Romania and Ukraine, net FDI inflows made up the largest positive component of the financial account. By contrast, (net) portfolio investment represented the financial account's largest positive component in Slovakia, Poland and Croatia. (Net) other investment – in particular loans – were negative in all countries under review. In Russia, capital outflows in all three categories were reported. Net FDI inflows covered more than 100% of the current account deficits in the Czech Republic, Bulgaria and Croatia, around 85% in Poland and around 50% in Romania and Ukraine.

Fiscal consolidation continues

With the exception of Croatia, budget deficits decreased in all the countries under review in 2011. In Russia and Hungary, deficits even turned into

surpluses. In Hungary one-off receipts from the de facto abolition of formerly compulsory private pension funds (the pension system's second pillar) had a positive impact on the budget. The European Commission, however, deemed this development to be unsustainable and thus inadequate for terminating Hungary's ongoing excessive deficit procedure (EDP) at its target date of 2011. The Council thereafter set 2012 as the new target year for a credible and sustainable correction of Hungary's budget deficit and concluded in late June that Hungary had taken the necessary measures to achieve this goal. Bulgaria managed to reduce its budget deficit to 2% of GDP in 2011. Hence, the EDP against the country was abrogated on June 22, 2012. The other EU Member States in the CESEE region are still in an EDP (with the target dates for reducing their excessive deficits being 2012 for Poland and Romania and 2013 for the Czech Republic and Slovakia).

The majority of CESEE EU countries continued fiscal consolidation in 2012. The deficits are set to decrease most strongly in Poland and Romania and should decline to (or stay) below the level of 3% of GDP in Bulgaria, Hungary, Poland and Romania, according to the budget plans of early 2012. While fulfilling the 3% of GDP criterion, Hungary's headline budget balance, however, is set to deteriorate markedly given last year's substantial one-off receipts. Budgetary targets had to be adjusted in many CESEE EU countries already in the course of the year as the pace of growth decelerated (e.g. in Slovakia, the Czech Republic, Poland and Hungary). As far as the remaining non-EU countries in the CESEE region under review are concerned, the deficit in Croatia is set to decrease, while Ukraine will post a higher budget deficit and Russia a lower budget surplus in 2012.

Increasing price pressures since summer

Price developments in CESEE can be roughly divided into two periods: disinflation in the first half of the year and some rise in price pressures since summer. Inflation declined in nearly each country under observation in the first and second quarters of 2012. This development was most pronounced in Ukraine, where an annual inflation rate of 5.1% in the final quarter of 2011 turned into deflation by the second quarter (–0.4%). Notable spikes in inflation rates in the Czech Republic, Hungary and Croatia were related to VAT hikes at the beginning of the year (in the case of the former two and in March in the case of Croatia). Inflation, however, generally started to pick up in summer, with only few countries reporting continuing disinflation (e.g. the Czech Republic and Poland). This development was strongly driven by rising prices of unprocessed food items brought about by the impact of hot, dry weather in many CESEE countries and also by higher world market prices. Contrary to the development of headline HICP and CPI inflation, house prices in the region continued to decline in the review period (within a range from –0.1% in Hungary to –8.9% in Romania year on year in the second quarter).[4]

Most central banks cut policy rates

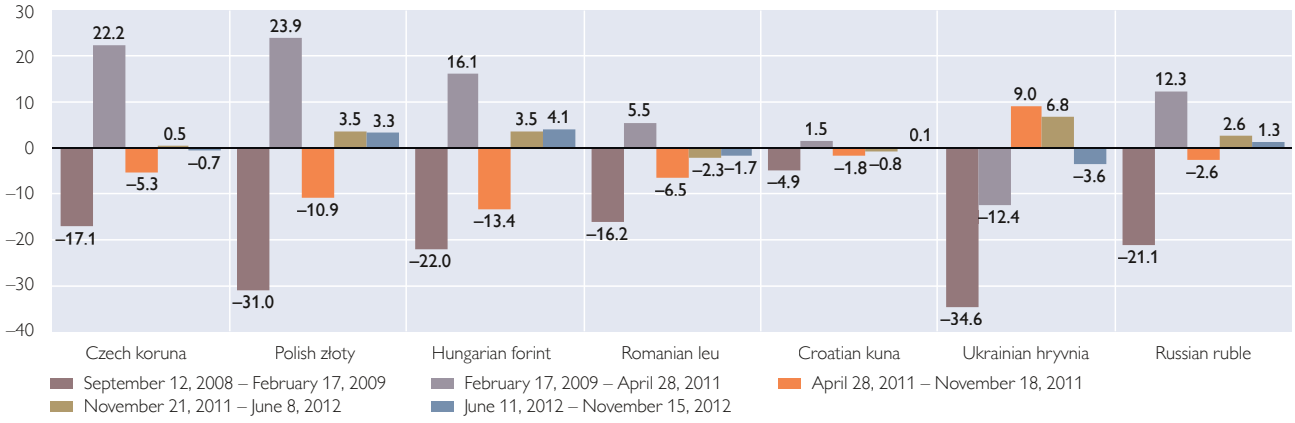
In the review period, the central bank of Russia increased its policy rate by 25 basis points to 8.25% in September in view of accelerating inflation. The Czech central bank (CNB) cut its key interest rate in June and September by 25 basis points each and in November by 20 basis points to 0.05%; the National Bank of Poland (NBP) low-

[4] *Comparable house price indices are not available for Poland, Croatia, Russia and Ukraine.*

Chart 2

National Currencies and the Euro

Euro per unit of national currency, change in %



Source: Thomson Reuters, OeNB.

Exchange rates appreciate moderately in many CESEE countries

ered its key interest rate by 25 basis points to 4.5% in November and the Hungarian central bank (MNB) did so in August, September and October (25 basis points each to 6.25%). The CNB argued that the monetary policy-relevant inflation rate (CPI adjusted for first-round effects of changes in indirect taxes) will be in the lower half of the tolerance band around its inflation target over the policy horizon (12 to 18 months in the future). The NBP stated that incoming data confirm a considerable economic slowdown, which has contained wage and inflationary pressure. The interest rate cuts by the MNB were based on the view – held by a slim majority of MNB Monetary Council members – that the inflation target was still likely to be met despite a substantial upward revision in the central bank's inflation forecasts for 2012 and 2013. The Monetary Council members backing the interest rate cut pointed at significant spare capacity and weak domestic demand as well as an expected fall in domestic risk premiums.

Looking at the currencies of the countries under review that have not yet adopted the euro and operate a float or a managed float, most currencies traded broadly stable against their reference currency from mid-June 2012 to mid-November 2012.[5] Several currencies, however, came under temporary pressure. In Ukraine, households' depreciation expectations and spikes of risk aversion in international financial markets led to interventions of the central bank to support the hryvnia's quasi-peg to the U.S. dollar. Together with sovereign debt repayments they were responsible for a steady decline of foreign exchange reserves before a eurobond issue of USD 2 billion in July made them temporarily rise. The Ukrainian foreign exchange reserves stood at EUR 22.7 billion at end-September (about 17% of GDP). The Romanian leu too had to be supported by foreign exchange interventions due to political turbulences, according to market participants. When the central bank started to restrict leu liquidity by

[5] *With the exception of Ukraine (U.S. dollar) and Russia (basket of currencies consisting of U.S. dollar and euro at a ratio of 55% to 45%), the reference currency of these countries is the euro.*

capping the volumes allocated at weekly repo operations, the currency stabilized. The Croatian central bank (HNB) also intervened several times to mitigate exchange rate pressures. In its most recent intervention in September, the HNB purchased foreign currency from the market (EUR 58 million) after having sold foreign currency (totaling EUR 1.5 billion) between November 2011 and mid-2012. Croatia's foreign exchange reserves decreased by 7.5% between April and August 2012 and amounted to EUR 11.4 billion (about 25% of GDP) at the end of September. Finally, the Russian central bank widened the ruble's fluctuation corridor slightly in mid-July to provide greater exchange rate flexibility.

Improvements in Risk Premiums amid Subdued Profitability in the Banking Sector

In line with global trends, financial markets picked up in CESEE throughout the review period (June 2012 to mid-November 2012). The introduction of the Outright Monetary Transactions program of the ECB as well as recent institutional steps within the euro area and improvements in the regulatory framework for the banking sector increased investor confidence, which, in turn, had a positive impact on financial market developments in almost all market segments in CESEE. Improvements were most pronounced in eurobond and CDS markets, but also equities performed broadly well. Only in Ukraine stock markets incurred moderate losses. Since June 2012, 5-year CDS premiums have been downtrending, with pronounced decreases having been recorded in Hungary and Croatia (by 320 basis points each), Bulgaria (by 274 basis points), Romania (by 221 basis points) and Ukraine (by 215 basis points). The strong reduction of risk premiums in Hungary is attributable partially to positive signals from the government about signing a precautionary credit line with the IMF and the EU. In the other countries of the region, risk premiums declined between 66 basis points (Czech Republic) and 167 basis points (Poland). In parallel with risk premiums, eurobond spreads declined throughout the region. Short-term interbank rates remained broadly stable in most CESEE countries. Since June 2012 they have declined strongly in Hungary and the Czech Republic, primarily owing to two policy rate cuts totaling 50 basis points in both countries.

Swift credit growth in Russia, deleveraging in Hungary

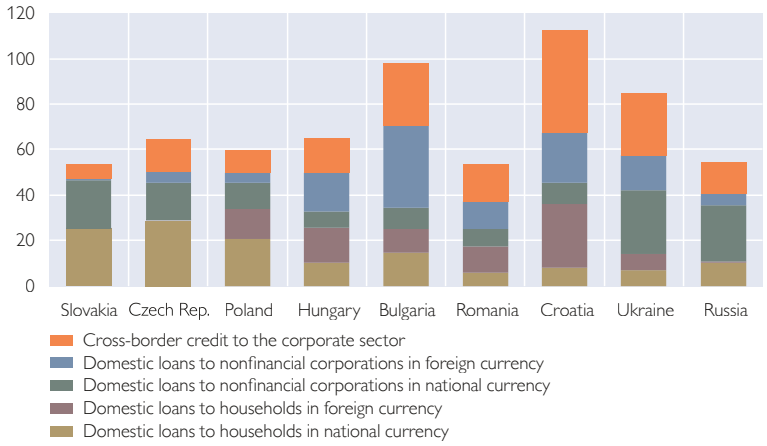
Total outstanding (domestic and cross-border) loans to the private sector – i.e. to households and nonfinancial corporations – increased in most CESEE countries between end-2011 and mid-2012. In particular, Russia saw a marked rise of 7.1% in total outstanding loans on an exchange rate-adjusted basis. In the Czech Republic, Ukraine and Poland, credit growth was in the range of 2% to 2.5% in the first half of 2012, while in Slovakia and Bulgaria modest increases of 1.3% and 0.4%, respectively, were recorded. In contrast, total outstanding loans fell markedly in Hungary (–4.5%) and Croatia (–2%) and modestly so in Romania (–0.1%). At 52% to 77% at mid-2012, the share of foreign currency loans in total loans to households remained at a very high level in Ukraine, Hungary, Romania and Croatia. In Ukraine and Hungary, this share slumped sharply (on an exchange rate-adjusted basis) compared with end-2011, while a marginal decline was registered in Poland. In Hungary the reduction of foreign currency loans, in particular those to households, contributed strongly to the decline in total outstanding loans. These dynamics were influenced by several

Pronounced improvements in eurobond and CDS markets

Chart 3

Banking Sector: Domestic and Cross-Border Credit to Private Nonbanks by Sector and Currency

As a percentage of GDP at mid-2012



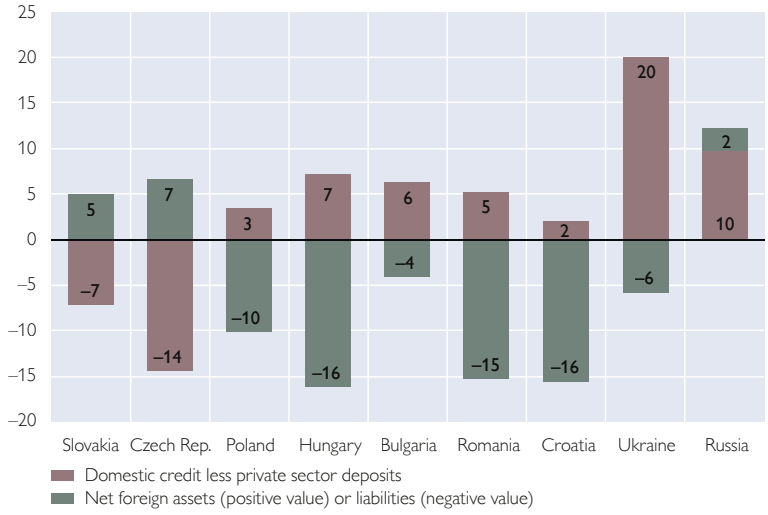
Source: ECB, Eurostat, national central banks, national statistical offices, OeNB.

Note: Domestic credit comprises loans to households and to nonfinancial corporations, except for Russia, where it includes also loans to other financial institutions (OFIs). Domestic foreign currency loans also include exchange rate-linked loans denominated in national currency. Cross-border credit to the corporate sector comprises cross-border credit to 'other sectors' (including OFIs), excluding trade credit and intra-company loans.

Chart 4

Banking Sector: Gap between Loans and Deposits and Net External Position

As a percentage of GDP in the four quarters until mid-2012



Source: ECB, Eurostat, national central banks, national statistical offices, OeNB.

Divergent trends in lending to corporates and households

measures introduced by the government to reduce outstanding household debt denominated in foreign currency. In Croatia the fall in total outstanding loans was driven by a firm reduction in foreign currency-denominated (or -indexed) debt of corporates. Although foreign currency debt of households in Ukraine was shrinking at a considerable rate, total outstanding loans still grew in the first half of 2012 owing to a strong increase in cross-border credit to the corporate sector. Cross-border loans to businesses also grew markedly in the Czech Republic and Poland while falling in Hungary, Bulgaria and Romania.

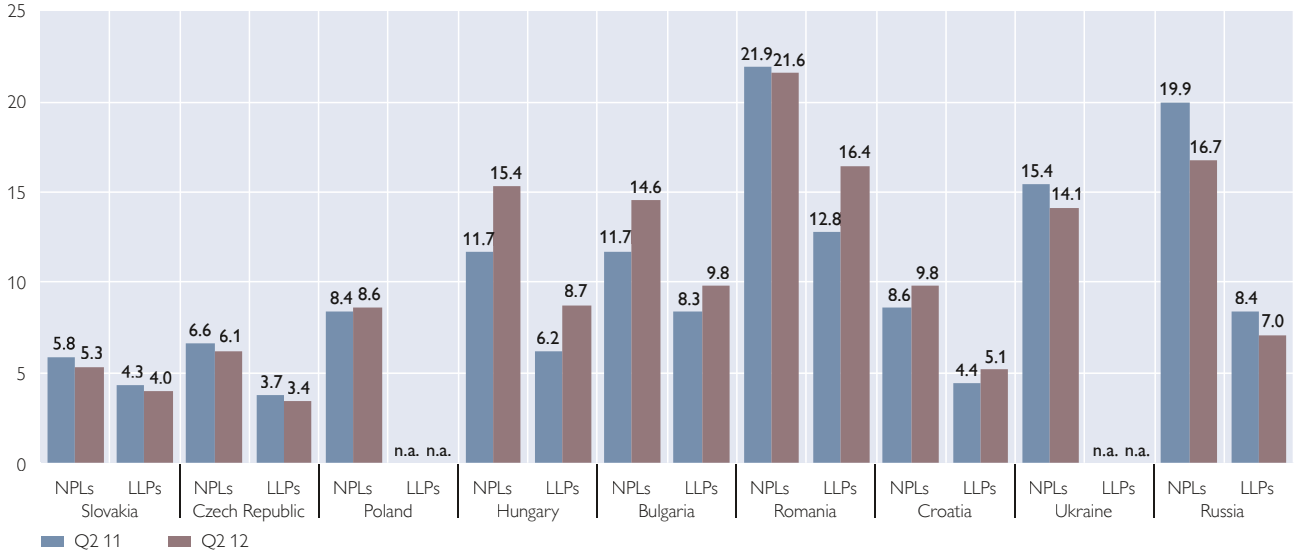
The ratio between (foreign and national currency-denominated) domestic household borrowing and domestic corporate borrowing (including cross-border credit) was relatively balanced in Slovakia, the Czech Republic, Hungary and Poland as at mid-2012 (see chart 3). By contrast, in Bulgaria, Croatia, Romania, and in particular in Ukraine and Russia, the volume of outstanding corporate loans was markedly higher than that of outstanding household loans. Comparably strong lending growth in Russia in the first half of 2012 was driven almost equally by the growth of loans to households and that of loans to corporates. In Bulgaria, Romania and Ukraine the positive contribution of growth in lending to corporates was partially offset by a decline in total loans to households. Household sector and corporate sector loan dynamics showed similar trends in the Czech Republic and Poland (i.e. an increase in outstanding loans) on the one hand and in Hungary and Croatia (a decline in outstanding loans) on the other hand. Total loans to households expanded only in Slovakia, where loans to corporates declined, though.

In the majority of the countries under review, total outstanding domestic loans continued to exceed total domestic deposits (relative to GDP) at mid-2012 (see chart 4). However, this funding gap broadly continued to narrow in

Chart 5

Banking Sector: Credit Quality

Nonperforming loans (NPLs) and loan loss provisions (LLPs) in % of total credit at end of period



Source: IMF, national central banks, OeNB.

Note: Data are not comparable between countries. NPLs include substandard, doubtful and loss loans. Poland including so-called irregular loans.

the first half of 2012. The gap between domestic loans and deposits declined in particular in Hungary and Croatia, primarily owing to domestic loans shrinking more strongly than domestic deposits. In Ukraine and Bulgaria, the gap narrowed due to a strong increase in deposits outpacing growth in total outstanding loans. In Romania, an increase in domestic deposits coupled with falling total outstanding loans was responsible for the gap narrowing. In Russia, by contrast, the gap widened markedly owing to the swift growth in domestic loans. Only Slovakia and the Czech Republic continued to show a surplus of domestic deposits over loans, which is also reflected in the positive net external assets registered by both countries' banking sectors. The surplus further increased in the course of the first half of 2012 in Slovakia, while it decreased in the Czech Republic. In Romania, Croatia and Hungary net external liabilities – in part comprising liabilities to foreign parent banks – were still substantial (relative to GDP) and considerably higher than in the other countries of the region.

Further reductions in funding gaps

Credit quality still remains a challenge in CESEE but improvements between mid-2011 and mid-2012[6] were recorded in some countries (see chart 5). Credit quality improved modestly in Romania, Slovakia and the Czech Republic. The banking sectors of Russia and Ukraine witnessed more pronounced reductions in the share of nonperforming loans in total loans (–3.2 percentage points and –1.3 percentage points, respectively, year on year). In Russia, the decline can be partially attributed to positive lending growth. By contrast, the share of nonperforming loans in total loans was higher in Hungary (+3.7 percentage

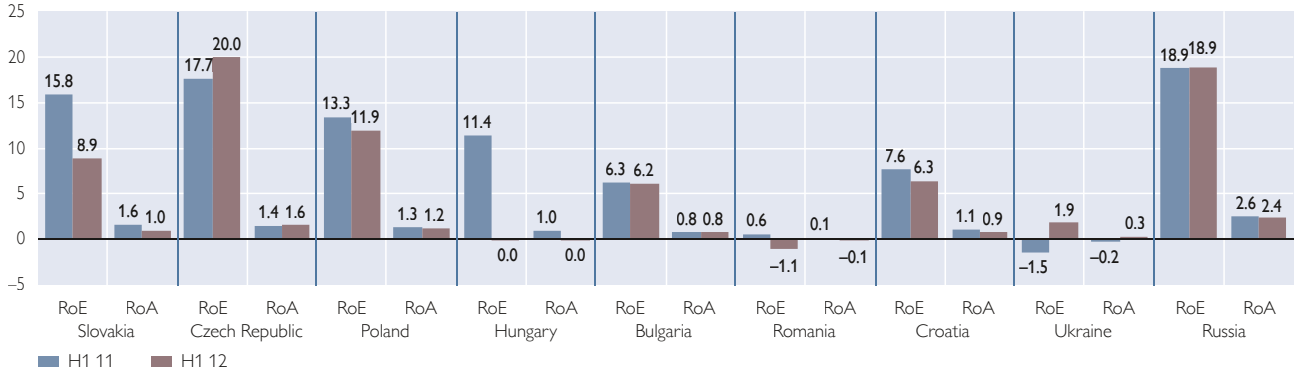
Credit quality improves in some countries

[6] *In line with profitability developments in the banking sector, which tend to show a seasonal pattern, credit quality is assessed on a year-on-year basis.*

Chart 6

Banking Sector: Profitability

Return on equity (RoE) und return on assets (RoA) in %



Source: IMF, national central banks, OeNB.

Note: Data are not comparable between countries. Data are based on annual after-tax profit, except for Russia's, which are based on pretax profit.

points year on year), Bulgaria (+2.9 percentage points year on year) and Croatia (+1.2 percentage points year on year) at mid-2012 compared with the same period of the previous year. In Poland, the share of nonperforming loans remained more or less unchanged (+0.2 percentage points year on year). Intra-year data show that the rise in nonperforming loans accelerated slightly in Croatia and Bulgaria in the first half of 2012. In Hungary, by contrast, growth in the share of nonperforming loans slowed during 2012. The reduction in the share of nonperforming loans in total loans accelerated in Romania and Slovakia in the first half of 2012, while it lost momentum in Russia and the Czech Republic.

Banking sector remains well capitalized

Banking sector profits continued to be subdued in the first half of 2012 in most CESEE countries, as is evident from chart 6. Compared to the same period in the previous year, profits declined strongly in Hungary and Slovakia and modestly in Poland, Romania, Croatia and Bulgaria. In Hungary, profitability fell to zero due to government measures to reduce outstanding foreign currency debt of households, the main burden of which was put on the banks, and owing to very high sectoral taxes on banks. Romania is the only country that recorded losses in the banking sector. By contrast, profit growth was registered by the Ukrainian, Russian and Czech banking industries. In the first half of 2012, Ukrainian banks posted profits for the first time since 2008.

Subdued profitability in CESEE banking sectors

The banking sectors in CESEE remained well capitalized in the first half of 2012. In Poland, Russia, Romania, Hungary and the Czech Republic, capital adequacy ratios ranged between 13.6% and 16.3% at mid-2012. The banking sector's average capital position was particularly strong in Ukraine (18%) and Croatia (20.2%). Compared to end-2011, capital adequacy increased modestly in Poland (+0.5 percentage points), Croatia (+0.6 percentage points) and the Czech Republic (+1.1 percentage points) and more strongly in Hungary (+1.8 percentage points) and Slovakia (+1.9 percentage points). In the case of Hungary the broadening of the capital base was partially driven by capital injections from parent banks. Capital adequacy decreased slightly in Romania (–0.2 percentage points), Bulgaria (–0.8 percentage points) and Russia (–0.9 percentage points).

Austria's Real Economy: Supported by the Low Interest Rate Environment

Corporate Debt Picks Up Slightly

Austrian Economy Slows Down

After unexpectedly strong growth at the beginning of 2012, Austria's economy has lost considerable momentum in recent months. The European financial and debt crisis has brought down Austrian exports and industrial production. Foreign trade has been dampened by the recession in important European export markets and thus no longer provides a growth impetus, which in turn has put a strain on domestic production. In the face of increasing uncertainty about future sales prospects, enterprises reduced or postponed their investment plans. This concerned in particular fixed investments which decreased slightly in the first half of 2012, while the growth of construction investment remained positive. Leading indicators signal that the economy lost further momentum in the second half of the year.

Investment demand was supported by corporate profits, even though the surge in corporate profitability which could be observed in 2011 abated somewhat in the first half of 2012. Corporate earnings were sustained by brisk economic activity at the beginning of the year and by falling commodity prices. Wage developments, however, did not support corporate profitability in the first half of 2012. In the second quarter, gross operating surplus was up 8.3% year on year. In addition, the nonoperational component of corporate profitability was boosted by the low interest rate level. While, in nominal terms, gross operating surplus already caught up with pre-crisis levels in 2011, the gross profit ratio (i.e. gross operating surplus in relation to gross value added of the corporate sector) has yet failed to reach its pre-crisis highs and even fell slightly in the first half of 2012 to 41.4%. However, this level was still markedly higher than the comparative level in the euro area.

Economic growth loses momentum

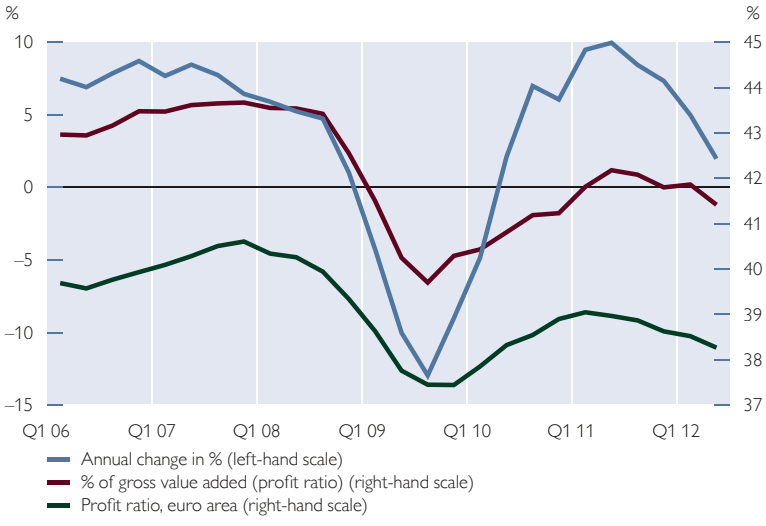
Corporate Sector Further Reduces External Financing

According to the financial accounts, the volume of external financing amounted to EUR 9.6 billion[1] in the first half of 2012, which was about one-third below the comparable 2011 figure. On the one hand, this decrease may reflect an increasing amount of internal financing owing to the still growing profits; on the other hand, it may be attributable to lower financing needs due to declining investment. The reduction in external financing was driven by a decrease in equity financing. Debt financing was almost 50% higher than in the first half of 2011 and accounted for almost 90% of the external financing volume (compared

Profit growth slows down

Chart 7

Gross Operating Surplus of Nonfinancial Corporations



Source: Statistics Austria.

[1] *Adjusted for foreign-controlled holdings in special purpose entities.*

to roughly 40% in the first half of 2011).

Bank Loans Gain Importance in Corporate Financing

Bank lending gains momentum

Lending by domestic banks accounted for around 20% of nonfinancial corporations' external financing in the first half of 2012, more than twice the comparable 2011 figure, which means that the growth of bank loans to the corporate sector in Austria has accelerated during 2012. According to the MFI balance sheet statistics, the annual rate of change in Austrian bank lending (adjusted for reclassifications, valuation changes and exchange rate effects) reached 2.7% in nominal terms in September 2012; deflated with the GDP deflator,[2] the growth rate amounted to 0.8% in the third quarter of 2012.[3] The largest contribution to loan growth came from lending at longer maturities (more than five years), which continued to record stable growth in Austria, whereas the growth of loans with a maturity of less than one year declined.

Falling lending rates

Thus, the Austrian corporate sector could avoid the slowdown witnessed in the euro area as a whole, where the nominal growth rate turned negative in the first half of 2012.

Banks tighten credit standards

This increase in lending in Austria took place despite the fact that, according to the Austrian results of the euro area bank lending survey (BLS), credit standards for corporate loans had been slightly tightened by Austrian banks since mid-2011. This tightening affected large firms more strongly than small and medium-sized enterprises (SMEs). Costs related to banks' capital positions and heightened risk concerns reflecting the economic slowdown affected banks' lending policies. At the same time, the banks surveyed in the BLS noted a slight decline in corporate loan demand, again primarily relating to large companies. On the one hand, this can be explained by somewhat lower funding requirements for fixed investment; on the other hand, companies still relied on internal sources of finance to a considerable extent, as they had sizeable amounts of cash to finance their activities (in September 2012, bank deposits were up 6.6% year on year).

Apparently, in the current phase, tighter credit standards have not materialized primarily in loan volumes but in tighter terms and conditions. Stronger risk discrimination by banks found its expression not only in higher margins on riskier loans, but also in rising collateral requirements as well as more (or stricter) loan covenants. Given banks' stricter loan policies toward large firms, these were faced with a stronger tightening than SMEs.

The net tightening of banks' lending terms and conditions partly offset the easing effect of interest rate cuts. In response to the three ECB interest rate cuts of November and December 2011 and July 2012 (by 0.25 percentage points each) and the associated decline in money market rates, corporate lending rates fell by 101 basis points between December 2011 and September 2012. While interest rates fell for all loan sizes and maturities, this decrease was slightly more pronounced for larger loans (with a volume of more than EUR 1 million) and for short-term loans.

[2] *Based on the GDP deflator for the second quarter of 2012, as the deflator for the third quarter was unavailable at the cutoff date.*

[3] *At the cutoff date, financial accounts data were available up to the second quarter of 2012. Therefore, the figures on growth contributions presented here refer to the first half of 2012. More recent developments of financing flows are discussed based on data from the MFI balance sheet statistics and the securities issues statistics.*

On top of loans by domestic banks (EUR 1.8 billion), Austrian enterprises took out EUR 0.9 billion from foreign banks in the first half of 2012, which corresponds to an annual growth rate of 15.7% in the second quarter of 2012. Taken together, Austrian and foreign bank lending accounted for about 29% of corporate external financing in the first half of 2012.

Bonds Contribute Considerably to Corporate Financing

In the first half of 2012, bond issues of EUR 3.6 billion accounted for more than one-third of Austrian companies' financing, which was well above the average of the previous years. In the first two quarters of 2012, net new bond issuance exceeded the total volume of new bank lending by one-third (thus reaching a volume twice that of loans from domestic banks) and remained strong in the further course of the year. At an annual growth rate of 11.8% (according to securities issues statistics), the expansion rate of corporate bonds in September 2012 markedly exceeded that of other financing instruments. From a funding perspective, this disintermediation may be viewed as a reduction of the corporate sector's dependence on one specific source of finance. This development would also be in line with the findings of the BLS that larger firms – to which market financing is primarily limited – were faced with tighter lending policies in 2012 than SMEs. However, a considerable portion of new bonds were issued by corporations that are majority-owned by the public sector. In the first half of 2012, these corporations' share in gross new issues amounted to some 55%, a percentage that roughly equals the average of the past five years. The share of variable rate bonds declined slightly in 2012, falling from 13.8% at the end of 2011 to 12.1% in September 2012, while the share of bonds issued in foreign currency remained flat at roughly 10%.

Bond yields, like bank lending rates, contracted in 2012, but their decline was much more pronounced than that of lending rates. After a marked increase in yields for lower-rated bonds caused by investors' lower risk appetite in the second half of 2011, the yields on BBB-rated bonds dropped by 329 basis points in the first ten months of 2012, reaching 4.01% in October 2012.[4] Over the same period, the yields on AAA-rated corporate bonds declined by 150 basis points, so that the yield spread between BBB issues and top-rated euro-denominated corporate bonds narrowed from 394 to 215 basis points, the lowest value recorded since July 2011. Bond yields were more than 4 percentage points below the peak values observed at the height of the financial market turmoil in the fall of 2008.

Bonds account for one-third of external financing

Low Recourse to Trade Credit

A noteworthy share in firms' funding sources is accounted for by trade credit, which represented more than 5% of outstanding financial liabilities at mid-2012. In the first half of 2012, while recovering from the reduction in the second half of 2011, the net volume of trade credit by domestic companies decreased by about 60% compared to the first half of 2011, vigorous sales at that time notwithstanding. As a key element of firms' working capital, trade credit closely depends on economic activity, of course; it is also possible, however, that – like short-term bank loans –

Trade credit declines

[4] *Euro area figures are used here, as no time series is available for yields on Austrian corporate bonds.*

trade credit may have been substituted by longer-term financing. What is more, it is possible that due to its relatively informal character and at the same time relatively high cost, increased recourse to trade finance might be correlated with financial distress and/or hampered access to other forms of finance. Thus, the low usage of trade credit may also be an indication that although bank credit standards were tightened this year, their increased restrictiveness did not drive firms into alternative sources of finance.

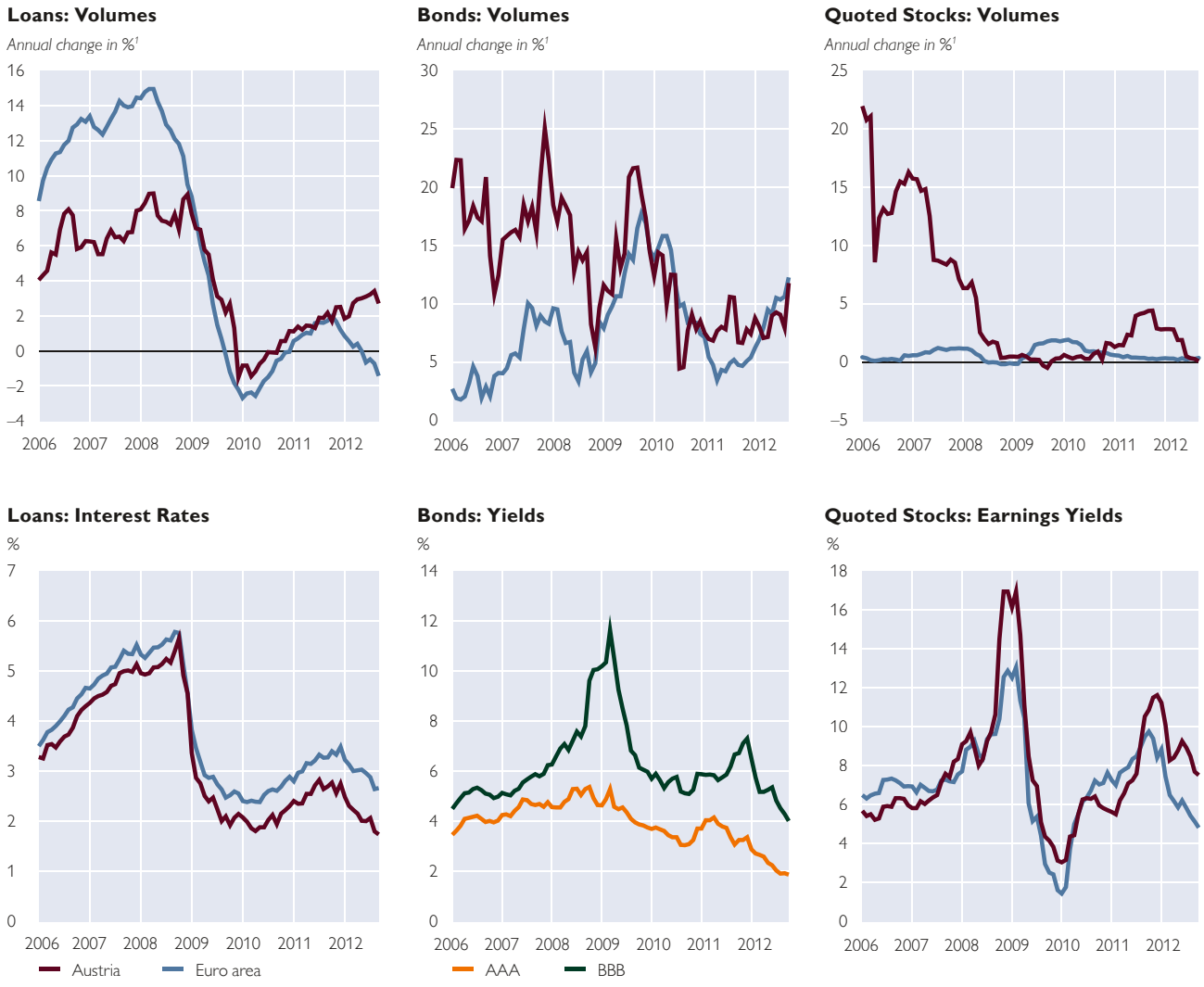
Equity financing almost at a standstill

Equity Financing Still Affected by the Crisis

Equity financing continued to be hampered by the crisis in the first half of 2012, with quoted stocks accounting for just 0.3% of external financing for nonfinancial corporations. There were no new listings in the first three quarters of 2012 and only a few capital

Chart 8

Key Elements of Nonfinancial Corporations' Financing: Volumes and Conditions



Source: OeNB, ECB, Thomson Reuters, Wiener Börse AG.

[1] *Adjusted for reclassifications, valuation changes and exchange rate effects.*

increases. Therefore, the amount of capital raised on the stock exchange amounted to less than EUR 0.1 billion and, taking a few small delistings into account, net issuance was virtually nil in the first three quarters of 2012. The earnings yield (i.e. the inverse of the price-to-earnings ratio) of the ATX, which can be used as an indicator of the cost of raising capital on the Austrian stock market, dropped from 11.6 in December 2011 to 7.5 in October 2012.

The development of other equity (unquoted stocks and other equity instruments) was also subdued in the first half of 2012 after having accounted for only roughly 10% (or close to EUR 1.0 billion) of external financing in 2011. In the first six months of 2012, corporations similarly obtained only little more than 10% of their external financing in the form of equity. Relative to the corporate sector's total liabilities, its equity position (i.e. the proportion of stocks in total liabilities) decreased from 42.8% to 42.3% in 2011.

Companies' Debt Servicing Capacity Deteriorates Slightly

The annual growth rate of corporate debt (in terms of total loans and bonds), which had slowed in 2011, started to rebound in the first half of 2012 and stood at 4.4% at mid-year. This increase was mainly attributable to long-term financing instruments, while short-term financing receded in the first half of 2012. Although this figure was still well below the long-term average, together with the slowdown in earnings growth, this acceleration reduced the sustainability of corporate debt somewhat. The ratio of corporate debt to gross operating surplus rose by 7 percentage points to 490%, which was still considerably higher than in the pre-crisis years. The ratio recorded by Austria was, however, lower than in the euro area as a whole. Reflecting increasing debt growth and subdued equity financing, the debt-to-equity ratio rose somewhat in the first half of 2012 and reached 121% in June 2012. Contrary to the debt-to-income ratio, the debt-to-equity ratio is considerably higher in Austria than in the euro area, which highlights the importance of debt financing in Austria.

Variable rate loans imply interest rate risk

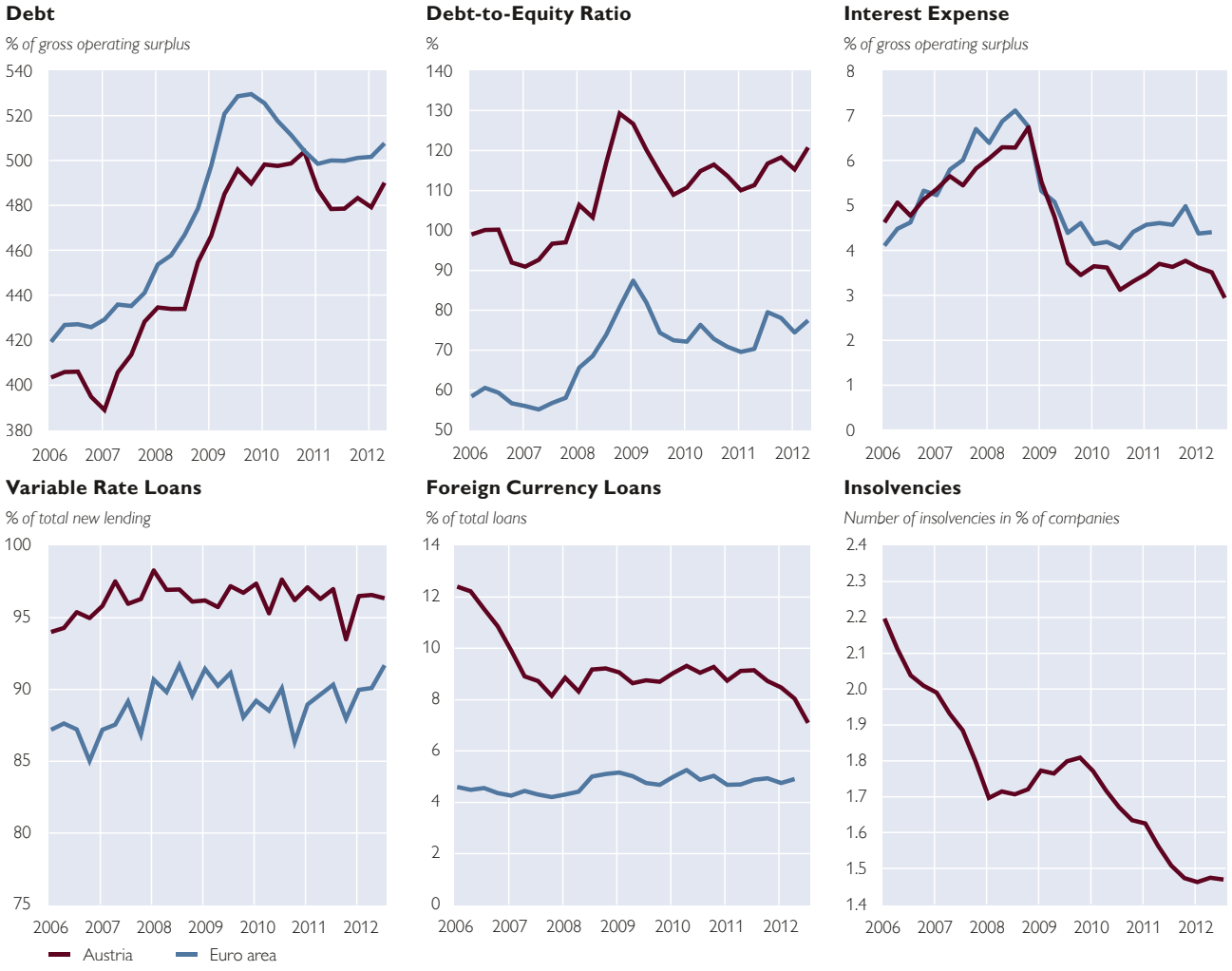
Firms' ability to service their debt continued to be supported by the low interest rates. In the first three quarters of 2012 interest expenses even declined in relation to gross operating surplus. However, even though corporate sector debt – and thus the sector's exposure to interest rate risk – has increased only moderately during the crisis, a rise in interest rates could create a noticeable burden for highly indebted companies. This aspect is especially relevant in the light of the above-average share of variable rate loans in Austria. Compared with their euro area peers, Austrian companies currently have markedly lower interest expenses, but their exposure to interest rate risk is considerably higher. Moreover, companies that face refinancing risks may also be more vulnerable to a tightening of bank lending standards. The level of corporate leverage, which is still high by historical standards, continues to imply considerable vulnerabilities to upward pressures on the terms and conditions of financing – be they price or non-price terms of loan contracts. The share of foreign currency loans in total corporate loans is currently almost twice as high in Austria as in the euro area, but has declined by roughly 2 percentage points in the course of 2012. There is, however, no evidence that banks have limited lending more than they usually would in an economic downturn,

Corporate equity position slightly decreases

Debt ratio rises

Chart 9

Risk Indicators for Nonfinancial Corporations



Source: OeNB, ECB, Eurostat, KSV 1870.

Number of insolvencies still low

implying that the risk of a possible recovery being hampered by a lack of bank funding is not to be considered large at this point.

The number of corporate insolvencies, which had increased relatively little since the onset of the crisis and declined since mid-2010, remained low in the first three quarters of 2012. Based on the total of the preceding four quarters (to adjust for seasonality) the number of insolvencies recorded in the third quarter of 2012 was 0.9% lower than the 2011 figure; it also dropped markedly in relation to the number of existing companies. On the one hand, this development can be ascribed to the so far rather slow rise in debt financing and the low interest rate level (which makes debt servicing easier even for highly indebted companies). On the other hand, the favorable economic developments in 2011 may have contributed to the decrease in insolvencies in 2012, given that insolvencies usually lag cyclical movements.

Foreign Currency Loans to Households Decrease Markedly

Rebound in Real Income Growth

Household disposable income grew in real terms in the first half of 2012, profiting from relatively high wage settlements and lively employment growth. However, inflation, negative wage drift as a result of the increase in part-time jobs, as well as shifts to jobs in the low-wage sectors put a drag on household real incomes. Even if the saving rate increased somewhat in the first half of 2012, it was still low by historical standards. For one thing, the low interest rate environment may have reduced the attractiveness of saving, and for another, the economic crisis particularly affected property income, i.e. that portion of disposable income that is probably much more likely to be saved than labor income.

Household Financial Investment Still Below Pre-Crisis Levels

After strong reductions in the first six months of each 2010 and 2011, household[5] financial investment rebounded slightly in the first half of 2012 and, at EUR 6.3 billion, was 13.8% higher than in the corresponding period of 2011, although it was still almost 40% below the pre-crisis peak value recorded in 2007.

At EUR 3.9 billion, deposits accounted for almost two-thirds of financial investment in the first half of 2012, thus almost doubling the corresponding 2011 figure. The largest inflows were recorded for overnight and short-term deposits, whereas the volume of long-term deposits declined in 2012. Broken down by types of deposits, demand deposits accounted for more than 70% of new deposits, whereas time and savings deposits contributed just 12% and 16%, respectively (even though their share in total outstanding deposits amounts to almost three-quarters). This ongoing shift in the maturity structure suggests that households have a high preference for liquidity, and may also be connected to low opportunity cost due to low interest rates.

Saving ratio remains low

In light of lingering uncertainty in the financial markets and considerable valuation losses in 2011, Austrian households have reduced their holdings of capital market assets since mid-2011. After a net disinvestment of EUR 0.7 billion in the second half of 2011, there was another slight outflow in the first half of 2012. Mutual fund shares and debt securities dropped in net terms by less than EUR 0.1 billion each, while investment in quoted stocks rose marginally (EUR 0.02 billion).

Capital market investment negative

As in the preceding years, investment in life insurance and pension funds had a stabilizing effect on financial investment in the first half of 2012, though with net investment of EUR 0.9 billion it fell by roughly one-quarter in year-on-year terms. Thus, they accounted for around 15% of total financial investment in the first half of 2012. Inflows into these instruments were, for a large part, not the result of current investment decisions, but – given the long maturities and commitment periods – reflected past decisions. Demand for funded pension instruments is a key factor in this context. Moreover, life insurance policies are often used as repayment vehicles for foreign currency bullet loans.

Investment in life insurance has stabilizing effect

Strong recourse to short-term deposits

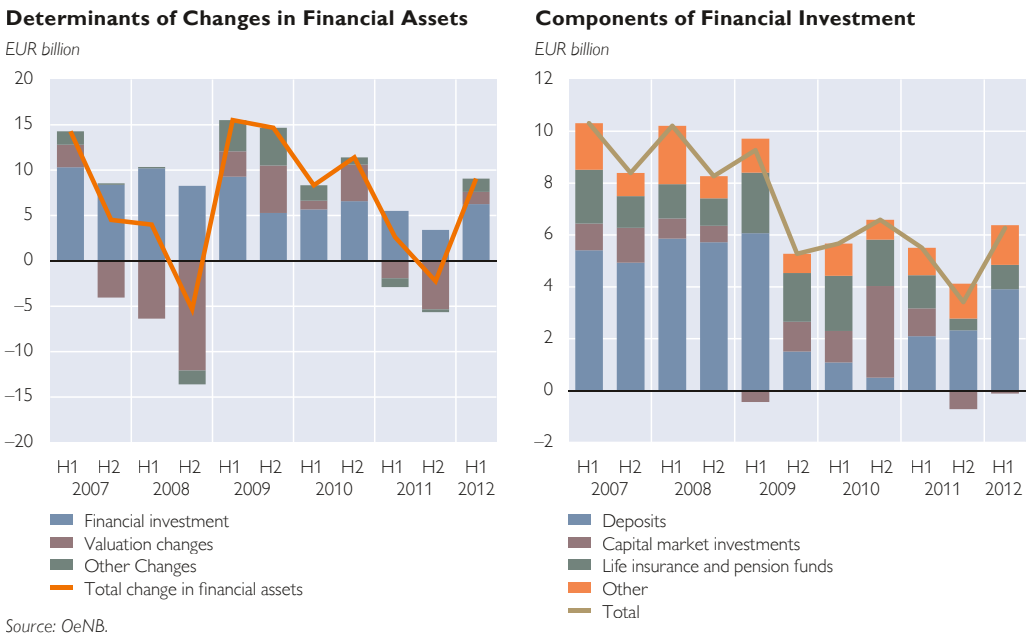
After the substantial (unrealized) valuation losses in their securities portfolios in 2011, Austrian households registered small valuation gains in the first half of 2012. At EUR 1.3 billion, these were equivalent to 1.4% of their

Considerable unrealized valuation gains

[5] *Nonprofit institutions serving households are not included here.*

Chart 10

Changes in Households' Financial Assets



Source: OeNB.

Foreign currency loans decline further

securities holdings. Quoted stocks, debt securities and mutual fund shares in the portfolios of Austrian households all registered roughly equal (unrealized) valuation gains. Taking financial investment, valuation gains and other changes together, financial assets rose by EUR 9.1 billion in the first half of 2012.

Lending Growth Subdued but Supported by Housing Loans

Growth of bank lending to households was subdued in 2012. From the second half of 2011 onward, annual growth rates receded continually and in August 2012 bank loans to households (adjusted for reclassifications, valuation changes and exchange rate effects) increased by a mere 0.3%. In September 2012, a slight rebound was registered when the annual growth rate increased to 0.8%.

A breakdown by currencies shows that euro-denominated loans continued to expand unabatedly (September 2012: 6.6%), while foreign currency loans were reduced markedly; in September 2012, they had fallen by 13.3% year on year. This considerable reduction highlights the effectiveness of the Austrian Financial Market Authority's minimum standards for granting and managing foreign currency loans, which aim at substantially limiting new foreign currency lending to households.

Broken down by purpose, the slowdown in loan growth was mainly driven by a decline in consumer loans (–1.8% against the previous year) and other loans (–2.5%). Housing loans still grew at 2.9% year on year, although their expansion rate also decreased in the course of 2012. While the favorable financing conditions probably still supported the growth of housing loans, and though households needed more funding to purchase real estate as housing prices have been on the rise in Austria (+15.7% year on year in Vienna and +10.1% in Austria excluding Vienna in the third quarter of 2012), other housing

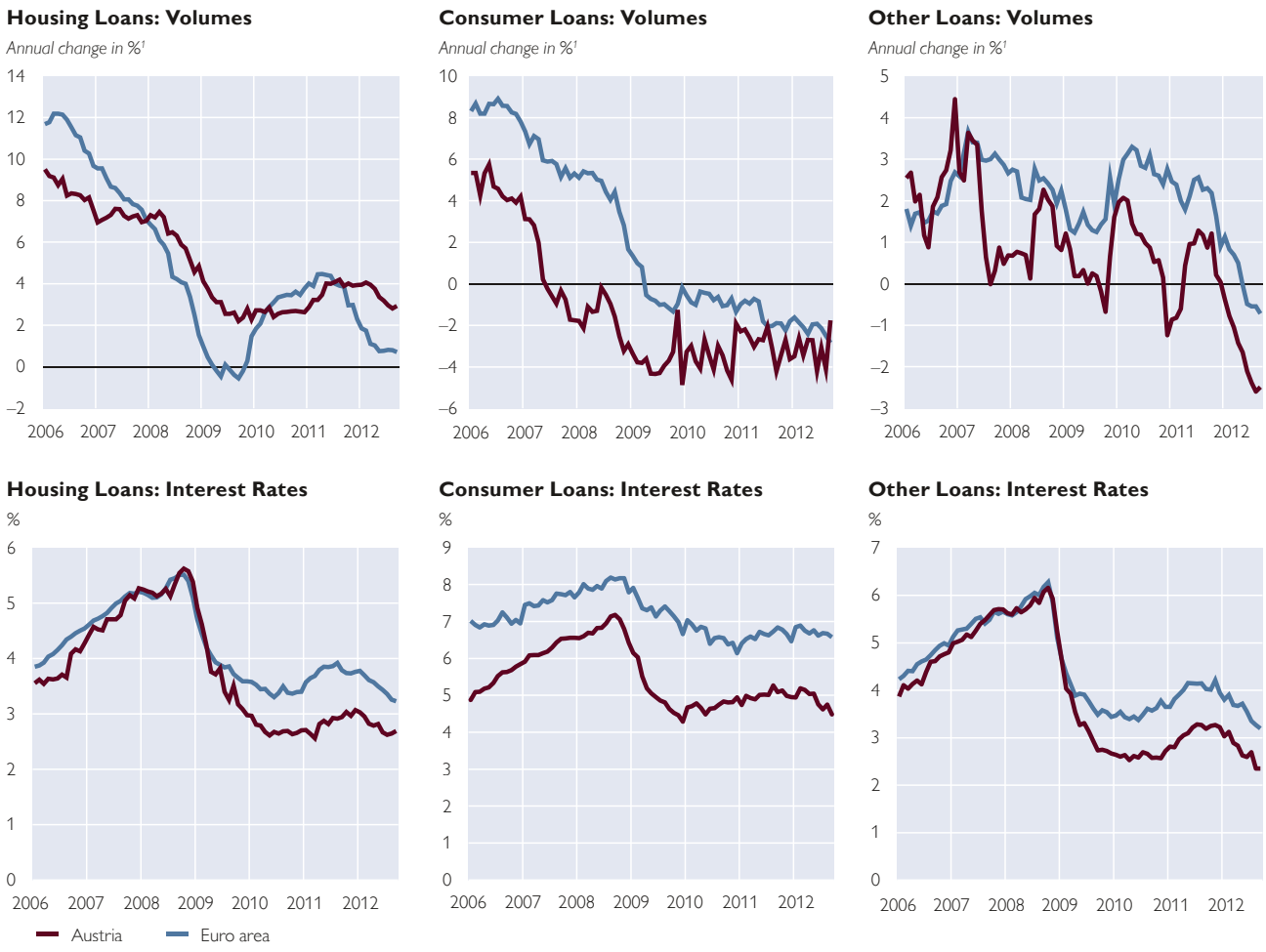
market indicators pointed to a downturn in credit demand. Although there are no current data on newly completed housing projects available, the falling number of residential building permits (–8.7% year on year in the first half of 2012) suggests a reduction in construction activity. According to results of the BLS, both banks' credit standards and households' demand for housing loans have been broadly stable in 2012 so far.

Loan conditions remained favorable. Interest rates on short-term loans (up to one year) stood at 2.80% in September 2012, 0.73 percentage points below their October 2011 level, reflecting the key interest rate cuts of November and December 2011 and July 2012 as well as the associated decline in money market rates. Looking at data across the entire maturity bands, interest rates on new housing loans stood at 2.69% in September 2012, which was 0.34 percentage points lower than the value recorded in October 2011. Over the same period, interest rates on consumer loans dropped by 0.65 percentage points to 4.48%. As a result, interest rates were 2.9 percentage points

Financing conditions remain favorable

Chart 11

MFI Loans to Households: Volumes and Conditions



Source: OeNB, ECB.

[1] *Adjusted for reclassifications, valuation changes and exchange rate effects.*

(housing loans) and 2.7 percentage points (consumer loans) below their pre-crisis levels.

Households' Currency and Interest Rate Risks

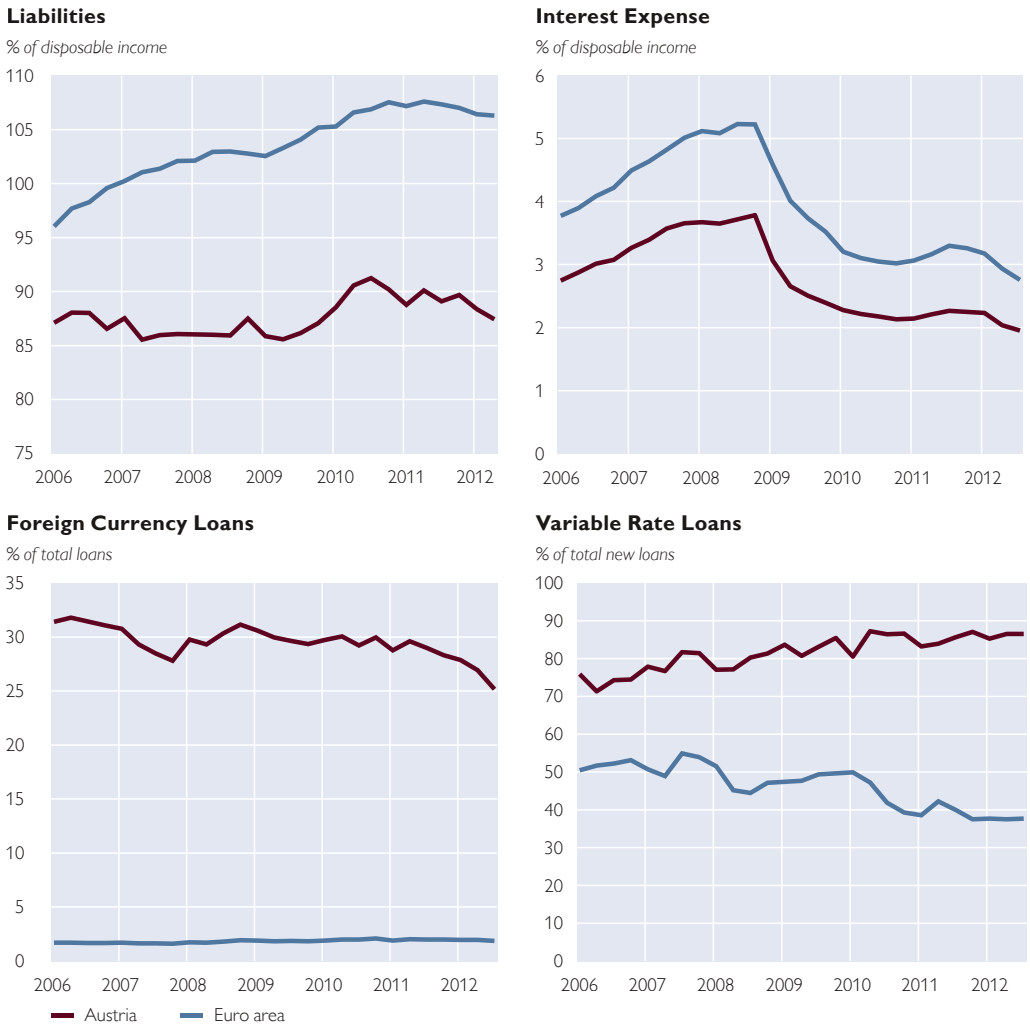
Household debt increases moderately

By international comparison, the indebtedness of Austrian households is rather low and has remained relatively stable during the crisis due to moderate borrowing. According to the financial accounts, total household liabilities stood at EUR 167.7 billion at mid-2012, up by a mere 1.1% in nominal terms from a year earlier. As a percentage of net disposable income, household debt amounted to 87.4% (–2.2 percentage points from end-2011). The debt ratio of Austrian households thus was again lower than in the euro area as a whole (106% in the first quarter of 2012).

Owing to a combination of moderate debt levels and low interest rates, household interest expenses remained low and even declined somewhat further in the first two quarters of 2012 on

Chart 12

Household Risk Indicators



Source: OeNB, Statistics Austria, ECB, Eurostat.

Note: Figures for the euro area represent only the interest expense on euro-denominated loans.

the back of reduced interest rates for bank loans. As a percentage of disposable income, interest expenses amounted to 2.0% in the second quarter of 2012, which was around 1½ percentage points less than before the onset of the crisis. One factor that contributed to this decline was the high share of variable rate loans. In the third quarter of 2012, 86.5% of new loans were granted with an initial rate fixation period of up to one year, which is a very high share by international comparison. Therefore, when the ECB lowered its key interest rates during the crisis, lending rates in Austria were reduced at a faster rate than in the remaining euro area. In addition, retail rates have generally been lower in Austria than in the euro area in recent years.

Share of foreign currency loans declines

Another risk factor for the financial position of Austrian households is the still high share of foreign currency loans in total loans. In the second quarter of 2012, 24.9% of total loans to Austrian households were still denominated in foreign currency. While this ratio has fallen by roughly 46 percentage points since 2009, households are still exposed to substantial exchange rate risk, even though the Swiss franc has not appreciated further against the euro since September 2011, when the Swiss National Bank set a maximum exchange rate of CHF 1.20 to the euro.

Interest expenses decrease further

Austrian Financial Intermediaries: Operating under Elevated Risks to Financial Stability

After a grounding year for Austrian financial intermediaries in 2011, the short-term perspective improved markedly in early 2012. Banks increased their overall profitability and insurance companies benefited from their activities in the CESEE region. The equity base of the Austrian banking system strengthened and the liquidity situation improved. At first sight, these developments (as illustrated by key measures for the Austrian banking system, see chart 13) seem reassuring, but further consideration suggests caution.

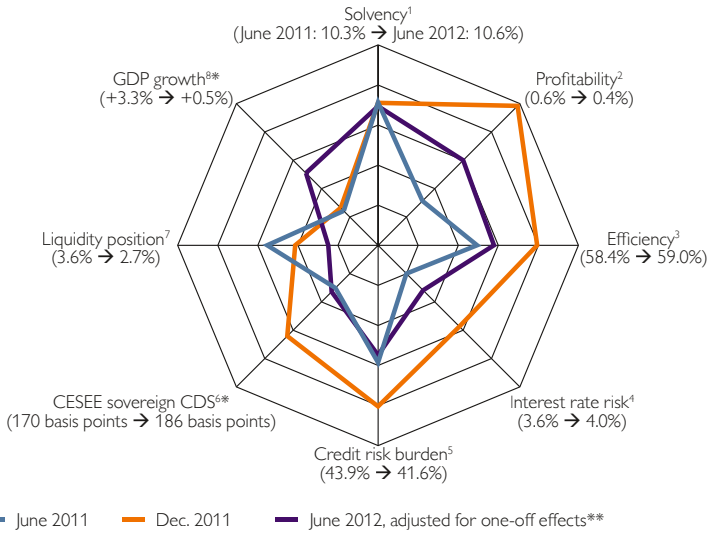
Net banking profits were upward-biased because of extraordinary revenue items related to capital measures. The CESEE business remains a net contributor to the overall profitability, but an ongoing deterioration of debtors' credit quality, as mirrored by the increase of the nonperforming loan ratio, has been persistently driving up credit risk costs. The increase in liquidity buffers was basically facilitated by the ECB's monetary policy but the more conservative liquidity risk profile also reflects sustained market uncertainty. At the same time, deposit growth at Austrian banks was above the European average over the past year and Austrian subsidiaries in the CESEE region increased their customer deposits as well. Reflecting this, the dependance of Austrian banks on ECB financing is still comparatively low.

Concerns about a credit crunch in Austria due to higher capital requirements, strained funding markets or a deteriorated asset quality have not materialized so far and the exposure of domestic banks to the CESEE region has even increased. New foreign currency lending in Austria has all but come to a halt; the outstanding amount will, however, pose a risk for many years because most foreign currency loans are bullet loans expiring in ten to twenty years.

In order to improve the stability of financial market infrastructures, new regulations like the one on over-the-counter derivatives, central counterparties and trade repositories are going to be transposed into Austrian law. The proposal for the establishment of a single supervisory mechanism (SSM) is an important step towards a genuine economic and monetary union in Europe. However, the SSM will have to be reinforced with an integrated crisis management framework and a common deposit guarantee scheme, as such tools constitute necessary pillars for a successful banking union.

Chart 13

Key Indicators for the Austrian Banking System



Source: OeNB.

[1] *Tier 1 ratio.*
[2] *Return on assets after taxes.*
[3] *Cost-to-income ratio.*
[4] *200 basis point interest rate shock (loss of eligible capital).*
[5] *Credit risk provisions in % of operating result.*
[6] *Exposure-weighted sovereign CDS spread.*
[7] *Cumulative 12-month funding deficit in % of total assets.*
[8] *Real GDP growth per annum.*

** Most recent value available at the cutoff date. ** Effects related to capital measures of several banks.*

Note: Consolidated figures, largely scaled on the basis of historical data. ***The closer the data points fall to the center, the better the ratios and the lower the risks.***

This section is structured as follows: It starts with a discussion of important developments in Austrian banks' balance sheets, including foreign activities and credit quality; goes on to review recent trends in profitability, current capitalization levels and regulatory improvements; and concludes with a brief note on nonbank financial intermediation.

Austrian Banks Faced with Legacy Assets and Challenging Market Conditions

Crisis-Related Focus on Customer Business Strengthens Resilience, but Structural Weaknesses Remain

Despite widespread concerns about asset reductions in the European banking sector since mid-2011, the consolidated total assets of Austrian banks actually increased by 4.5% in the past 12 months. Following a crisis-induced decrease of consolidated total assets between 2008 and 2009 and a second wave in 2010, Austrian banks expanded their balance sheets in the first half of 2012, to approximately EUR 1,189 billion (+4.5% year on year). Overall, the size of the Austrian banking sector in terms of total assets is large by international comparison, which also reflects the greater dependency of the Austrian economy on bank intermediation as opposed to other financial intermediaries or direct finance.

Austrian banks tended to reinforce their customer business in recent years, while gradually reducing interbank activities. Despite the reduction in overall interbank activities, the level of interconnectedness between Austrian banks on the domestic market remains relatively high, primarily as a result of the multi-tier structure of the decentralized sectors (Raiffeisen, Sparkassen and Volksbanken). To shed more light on this topic, this report also provides a detailed network analysis of the Austrian banking system (see the Special Topics section).

In their domestic business, Austrian banks are increasingly focusing on core business activities. Current regulatory reforms are likely to further encourage banks to concentrate resources on well-performing areas and divest in non-core business. Some banks have announced plans to sell leasing subsidiaries and scale back investment banking activities during 2012. In addition, the ongoing restructuring of three medium-sized Austrian banks which received government support should also increase the resilience of the banking system against future turmoil and therefore support financial stability.

Above-average bank branch and staff density

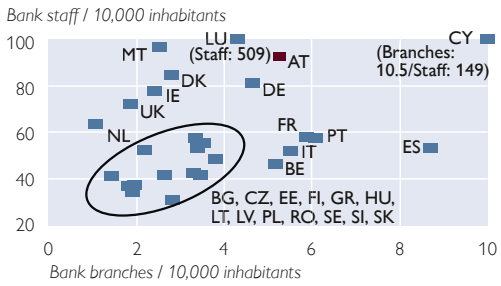
Structural weaknesses of the Austrian banking system remain essentially unchanged compared to the height of the global financial crisis. The Austrian banking sector is characterized by a large number of banks, local branches and staff compared to the size of the population. In mid-2012, a total of 822 banks were registered in Austria, which reflects the prominent role of the decentralized sectors of the banking system. On average, banks had 5.2 local branches with a staff of 92.5 for every 10,000 inhabitants (as of end-2011). Based on ECB data, the branch density within the European Union was only higher in Portugal, Spain, Italy, Cyprus and France, and the bank staff density only in Luxembourg, Malta and Cyprus (see chart 14).

High interconnectedness because of decentralized multi-tier structures

A new early intervention and bank resolution framework is needed to address structural weaknesses more proactively than in the past. The OeNB and the Austrian Financial Market Authority (FMA) have repeatedly pointed at the need for a legal framework for early intervention and the orderly resolution of troubled banks, and proposed cornerstones of such a framework in early 2012. The Austrian government has committed itself to present a legislative proposal focusing on early intervention by year-

Chart 14

EU-27 Comparison of Bank Branches and Staff Relative to Population Size



Source: ECB, Eurostat, OeNB.

end. In parallel there are plans to create a European resolution framework as one of the building blocks of the envisaged European banking union (see box on page 46) and the European Commission issued a draft directive on bank recovery and resolution in June 2012. In case the plans currently under discussion for a European resolution mechanism do not lead to an operational system in the foreseeable future, the current national proposal should be complemented with a bank resolution framework as soon as possible. Otherwise, public bailouts could remain as the only "feasible" resolution option in individual cases. This outcome is socially undesirable for several well-known reasons (violation of basic principles of a market economy, moral hazard, fiscal costs, etc.), including its implications for lasting financial stability.

Decreasing exposure to euro area countries under market pressure, CESEE commitments maintained

Diverging Trends in the Foreign Exposure Development of Austrian Banks – CESEE Region Up, Euro Area Periphery Down

Recent foreign exposure developments of Austrian banks point at diverging trends, foremost between the CESEE region and euro area countries with high risk premiums. Totaling EUR 215.5 billion in June 2012 (see table 1), the exposure[1] of majority owned Austrian banks to the CESEE region has remained almost unchanged compared with end-2011 figures. While the exposure is broadly diversified, the lion's share of 57% was recorded vis-à-vis the countries that joined the EU in 2004 (NMS-2004). In comparison, economies in Southeastern Europe (SEE), the NMS-2007 states and the CIS economies accounted for 18%, 15% and 10%, respectively, of the overall exposure. The exposure to Poland stands out with a marked increase by about 50% over the first six months of 2012, resulting from the purchase of Polbank by Raiffeisen Bank International AG. As addressed later in more detail, this acquisition affects several key indicators such as foreign currency lending and credit quality.

At the same time, Austrian banks continued to reduce their exposure to euro area countries currently under market pressure. The exposure to euro area EU/IMF program countries (Greece, Ireland and Portugal) is limited and on a continued downward trend: after a reduction of about one-third within the first half of 2012 – partly related to the Greek private sector involvement scheme, write-downs and risk provisioning – foreign claims amounted to EUR 2.7 billion in June 2012. The exposure to Italy and Spain amounts to EUR 15.4 billion, down about EUR 2.1 billion since end-2011.

Concerns about widespread deleveraging by Austrian banks in the CESEE region

[1] *Here, exposure refers to the on-balance exposure of majority Austrian-owned banks to credit institutions and nonbanks in CESEE. Majority Austrian-owned banks exclude, for instance, UniCredit Bank Austria (majority-owned by Italy-based UniCredit group), Volksbank International (majority-owned by Russia-based Sberbank) and BAWAG (majority-owned by U.S.-based Cerberus).*

have not materialized so far, yet data indicate significant differences at the country level. In connection with the current economic difficulties and new regulatory measures, there have been worries that banks might restrict lending to the real economy, causing a credit crunch and thereby slowing down economic growth. Deleveraging fears are most prominent with regard to the CESEE region, where Austrian banks have high market shares in various countries. However, as far as available data show, the Austrian banking system[2] remains committed to the CESEE region and Austrian banks' business models are consistent with the spirit of the Vienna Initiative 2. Going forward, the OeNB continues to support the objectives and principles of the Vienna Initiative 2 and commends an ongoing intense dialog taking into account both home and host perspectives.

Since the height of the CESEE market turmoil in early 2009, Austrian banks' exposure to the region has increased by more than a cumulative 9% as reported or close to 14% when adjusted for exchange rate effects and provisions.[3] Even when excluding the recent acquisition of Polbank, the increase still amounts to 7% (11% when adjusted). This development is not uniform across the countries in which Austrian banks have substantial exposures, however. In sum, the exposure shrank by approximately 3% in countries with a difficult economic and/or regulatory environment (Ukraine, Kazakhstan and Hungary), but this decrease was more than compensated by an aggregate increase of 17% in

Table 1

Foreign Claims of Austrian Financial Intermediaries in June 2012 (on-balance sheet, immediate borrower basis)

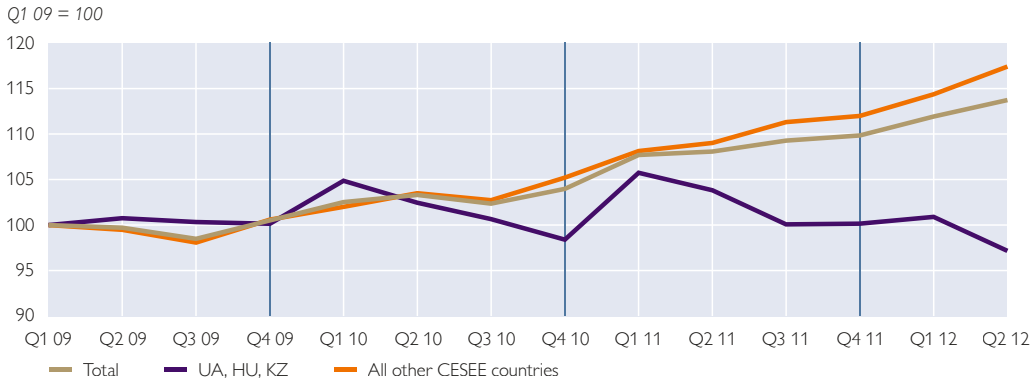
	CESEE	IT	ES	IE	PT	GR
	EUR billion					
Banks (domestically owned)	215.5	12.9	2.5	1.5	0.7	0.5
Banks (total)	326.1	22.8	3.6	3.2	1.3	0.6
Insurance companies[1]	4.5	2.1	1.3	1.4	0.2	0.0
Pension funds and severance funds[1]	0.5	0.7	0.3	0.0	0.0	0.0

Source: OeNB.

[1] *Securities held in Austria.*

Chart 15

Development of Austrian Banks' CESEE Exposures from Q1 2009 to Q2 2012



Source: OeNB.

[2] *All banks with an Austrian banking license, irrespective of whether they are majority Austrian or foreign owned, including their respective CESEE subsidiaries.*

[3] *Reported exposure is distorted by movements in exchange rate effects and loan loss provisions. Even if real loan volumes were constant, figures reported in euro would grow or shrink as exchange rates fluctuate. In order to monitor the development of exposures, those effects need to be neutralized, as it is done in chart 15.*

other CESEE countries,[4] as illustrated by chart 15.

Strong demand for home improvement loans

A gradual reduction in leverage is a welcome development from the perspective of financial stability. Times of economic difficulty usually go hand in hand with lower demand for credit, as businesses and households scale back investment and consumption. As the current crisis was in part caused by misdirected investments into only seemingly profitable projects, this effect is more pronounced in the present environment. Over the past few years, those misled investments as well as credit-funded consumption led to the build-up of system-wide leverage. Both the nonbank private as well as the banking sector increased the use of debt relative to equity, which increased risk and reduced their capacity to absorb shocks and unexpected losses. Economic agents are now making efforts to repair their balance sheets, which is a necessary path to adjustment. With a view to financial stability in Europe, the observed gradual reduction in leverage is therefore foremost a welcome development, as lower leverage decreases both the potential for risks as well as the degree of financial interconnectedness, and thereby mitigates systemic risk.

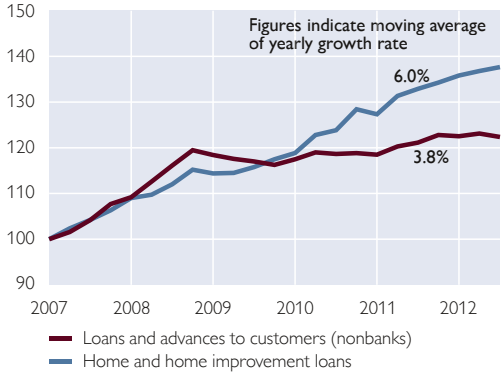
Stable Credit Growth in Austria

Concerns about a credit crunch in Austria due to higher capital requirements, strained funding markets or a deteriorated asset quality have not materialized so far. Though growth rates weakened, the supply of credit to the Austrian economy has remained virtually stable (see the section on Austria's real economy starting on page 19). By September 2012, the volume of loans to domestic nonbanks amounted to EUR 331.9 billion, almost 1.8% higher than the year before. With regard to the composition of domestic loan growth, it is notable that loans for home and home improvements have been outpacing the general development since 2010 (see chart 16). This development may be traced back to the growing demand for real estate in Austria as a perceived safe haven investment in times of heightened economic and financial uncertainties, which is reflected in the recent surge in property prices. Though still low by international comparison, the property price increases will have to be followed closely given their potential repercussions for financial stability. In particular it will be crucial to determine to which extent the recent property price increase has been related to bank lending and how loan-to-value

Chart 16

Loan Growth in Austria

Q1 07 = 100



Source: OeNB.

[4] *Of the countries with a substantial exposure of Austrian banks, reductions in reported (i.e. unadjusted) exposure were largest in Ukraine, Kazakhstan (both –18% since Q1 2009) and Hungary (–11%), reflecting economic difficulties as well as elevated levels of political risk. In contrast, exposures to other countries grew substantially, with Poland (+65%), the Czech Republic (+29%), Slovakia (+14%) and Russia (+10% since Q1 2009) featuring prominently.*

(LTV) and debt/payment-to-income (DTI/PTI) ratios in this segment look like. Closing existing data gaps in this respect will be important.

Lending by Austrian subsidiaries in the CESEE region has increased slightly. As of mid-2012, the 70 fully consolidated CESEE subsidiaries of Austrian banks posted total assets of around EUR 281 billion, which corresponds to a semiannual increase of 1.8% without accounting for the acquisition of Polbank. At the same time, the loan volume increased to EUR 176 billion. On a net basis (i.e. after risk provisions) and adjusted for the stated acquisition, loan growth was essentially flat (+0.2% year on year).

Foreign Currency Loans Remain a Financial Stability Concern

New foreign currency lending in Austria has all but come to a halt, while the legacy of the period from the mid-1990s to 2008 remains a medium-term concern. The stock of foreign currency loans (FCL) in Austria has been on a steady decline since autumn 2008 and new foreign currency lending accounted for only around 4% of total new lending to households since end-2010. As of September 2012, foreign currency loans to domestic nonbanks in Austria summed up to EUR 50.7 billion, corresponding to 15.3% of all loans, of which EUR 34.6 billion were owed by households (FCL share of 25%) and EUR 10 billion by nonfinancial corporations (FCL share of 7%). The outstanding foreign currency loan stock of domestic nonbanks declined by 14.1% on a year-on-year basis (adjusted for foreign exchange rate effects) (households: –13.3%, nonfinancial corporations: –21%).[5] The Swiss franc continued to be the dominant currency for foreign currency loans (93% for households, and 72% for corporates), while the Japanese yen and the U.S. dollar play a minor role.

New lending in foreign currency very limited in Austria

Foreign currency loans and repayment vehicle loans in Austria continue to be a challenge for borrowers and banks. In September 2012 roughly 72% of foreign currency loans to households were designed as repayment vehicle (RPV) loans, where regular loan installments are replaced with a regular savings plan (involving capital market-related products in three out of four cases). This framework serves to repay the outstanding debt in a lump sum at the maturity of the loan. As a result, the associated credit risk is linked not only to exchange rate movements but also to asset price fluctuations. In addition to foreign currency RPV loans, Austrian banks hold euro-denominated RPV loans in the amount of EUR 3.1 billion, which only exhibit asset price risk in addition to the ordinary credit risk. According to an OeNB/FMA survey, aggregate funding gaps of all RPV loans to households amounted to EUR 4.7 billion or 18% of the outstanding loan volumes in mid-2011. Given the maturity profile of foreign currency loans to retail customers (see chart 17), those gaps are a big issue for Austrian banks not necessarily in the short run but in the medium to long term. Therefore Austria is currently implementing the recent recommendations of the European Systemic Risk Board (ESRB) with respect to foreign currency lending.

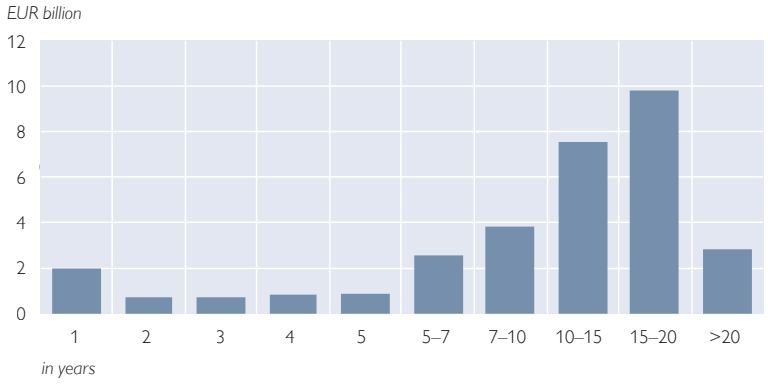
In the CESEE region, foreign currency loan developments were distorted by one-off effects in the first half of 2012. Among the CESEE subsidiaries of the top 6 Austrian banks, the share of foreign currency loans in total loans went down by 2 per-

[5] *The decline in the FCL volume of nonbank financial intermediaries and of the public sector was below the domestic nonbank average.*

centage points, to 46% or EUR 86 billion until June 2012 according to a semiannual OeNB survey. Adjusted for exchange rate effects and the acquisition of Polbank, this corresponds to a reduction by 2.9% since end-2011. Part of the reduction, however, was due to the migration of a number of nonperforming foreign currency loans to the foreign currency leasing portfolio, predominantly by one banking group. The acquisition of Polbank also affected the currency composition of the foreign currency loan portfolio of CESEE subsidiaries: The Swiss franc-denominated loan portfolio, which actually declined significantly during the first half of 2012, thus increased by 1.8 percentage points to 18.7%. The euro maintained its dominant position and accounted for more than half of the total foreign currency loan portfolio held by Austrian bank subsidiaries in the CESEE region in June 2012 (58%). Similarly, approximately 79% of direct cross-border foreign currency[6] loans granted by Austrian banks to borrowers in the CESEE region were denominated in euro, while the Swiss franc played only a minor role in that segment (4.2% as of June 2012).

Chart 17

Maturity of FX Bullet Loans to Retail Customers in Austria in September 2012



Source: OeNB.

Credit Quality Worsens Further in CESEE while Staying Stable in Austria

Persistently heightened credit risk costs are a consequence of an ongoing decline of debtors' credit quality mirrored by the increase of the nonperforming loan ratio (see chart 18). The increase in the consolidated nonperforming loan (NPL) ratio was almost exclusively driven by Austrian banks' exposure to CESEE countries which had to cope with a difficult economic environment during the previous crisis years and whose outlook is still moderate. While the development of the unconsolidated NPL ratio (i.e. domestic business in Austria) totaled approximately 4.6% in June 2012, having remained almost flat over the last quarters, the NPL ratio of Austrian subsidiaries in the CESEE area accumulated to 15.9%, inter alia driven by above-average ratios in the foreign currency loan segment (19.7%). The consolidated NPL ratio of the Austrian banking system stood at 9.1% in mid-2012. The worsening credit quality of CESEE portfolios can also be seen from the development of loan loss provision ratios (see chart 19).

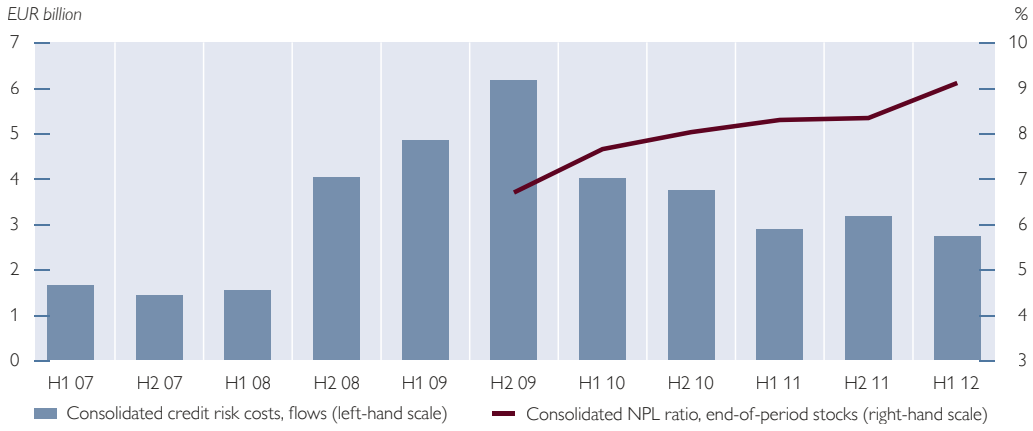
While having remained stable in the domestic market, loan loss provision ratios continue to rise at subsidiaries abroad. The unconsolidated loan loss provision ratio,[7] which primarily covers loans to domestic customers, broadly remained at the level recorded in mid-2011 (3.2% as at September 2012). In the CESEE region, loan loss provision ratios increased in most countries during the

[6] *Foreign currency from a borrower's perspective, i.e. loan denominated in a currency other than the local currency in the borrower's country of residence.*

[7] *Stock of specific loan loss provisions for claims on nonbanks as a share of total outstanding claims on nonbanks.*

Chart 18

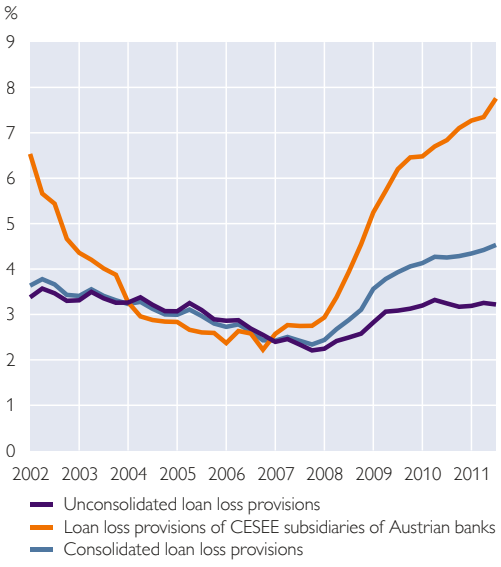
Consolidated Credit Risk Costs and NPL Ratio of Austrian Banks



Source: OeNB.

Chart 19

Loan Loss Provisions of Austrian Banks



Source: OeNB.

Note: Loans to nonbanks in all cases.

first half of 2012, most notably in the NMS-2007 economies. In June 2012 the ratio stood slightly above 10% in the NMS-2007 and CIS subregions (10.6% and 10.4%, respectively), while it averaged 6.1% in the NMS-2004 countries and 6.9% in SEE economies. Over the past four years, the loan loss provision ratio of foreign subsidiaries of Austrian banks has risen by a total of 5 percentage points. Despite that increase and given the fact that restructuring in the loan portfolio of banks quite naturally plays a role during economically difficult times, an adequate coverage of NPLs by loan loss provisions is an important element of financial stability.

Together, domestic and foreign credit quality developments resulted in a slightly increased consolidated loan loss provision ratio in the first half of 2012 (4.5% as of mid-2012). The moderate increase of the ratio in the first half of 2012 is mainly due to the fact that the unconsolidated loan loss provision ratio still covers more than 70% of all nonbank exposures of Austrian banks. In international fora, loan forbearance gained attention. In line with their peers, Austrian authorities contribute to work ongoing in this field.

Increased Funding Resilience of Austrian Banks

Customer deposits have traditionally played an important role in funding for Austrian banks. Austrian households hold roughly 50% of their financial wealth in bank deposits, much more than their peers in

the U.S.A., the U.K. and the euro area, which contributes to a stable refinancing situation. Customer deposits by households and nonfinancial corporations accounted for approximately 80% of total loans to nonbank customers in the domestic market, corresponding to an unconsolidated customer loan-to-deposit ratio of 124% as of mid-2012 (–3.8 percentage points year on year).

CESEE subsidiaries improved their deposit base

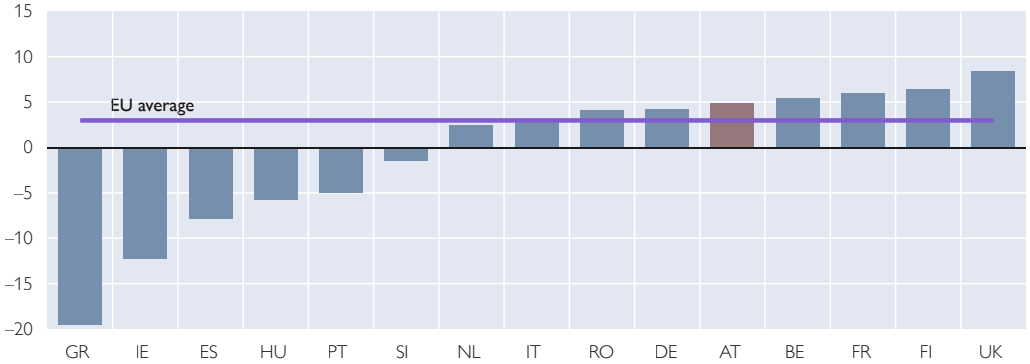
Deposit growth rates of Austrian banks exceeded the European average over the past year (see chart 20). In an environment of tightened funding conditions, European banks have come to rely more strongly on customer deposits to ensure a stable funding base. While several European banking systems managed to increase their local deposit base in recent quarters, a few countries at the center of the European sovereign debt crisis have faced deposit outflows in the course of 2012.[8] With an average growth rate of almost 5% in Austria, domestic banks were able to increase customer deposits at a rate above the EU-27 average (approximately 3% in June 2012) and in the average range of those EU countries which registered positive domestic growth rates (5.5%, fostered by strong growth rates in some EU Member States outside the euro area such as Sweden or the United Kingdom). There is growing evidence that banks in Austria experienced a net increase in foreign deposits. The strong deposit growth may be seen as evidence of the higher confidence in the Austrian banking system as compared to the confidence in some troubled banking systems, and it may also reflect the lack of alternative safe and liquid assets.

Austrian banks' subsidiaries in CESEE increased their customer deposits by 5.3% over the past year, driven by strong growth in a few countries. Customer deposits expanded at a strong pace in Russia, Slovakia and Bulgaria, while declining at Hungarian subsidiaries.[9] The increase in local customer deposits and the associated improvement in the loan-to-deposit ratio of the CESEE subsidiaries of Austrian banks (which shrank to 104% by June 2012) are favorable developments from an Austrian supervisory perspective and correspond with

Chart 20

Deposit Growth in the EU

Annual growth rate as measured in June 2012 in %



Source: OeNB.

[8] *See the IMF's Global Financial Stability Report of October 2012, chapter 2.*

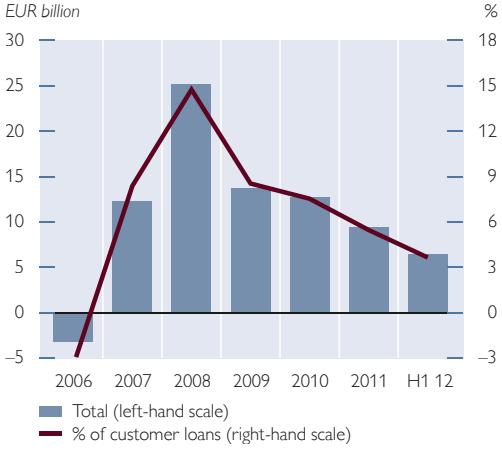
[9] *Partly related to the early repayment scheme for foreign currency loans in Hungary.*

the objective of a stronger local stable funding base as stated in the "sustainability package" developed by the OeNB and the FMA (see chart 21). In general, a greater reliance on local funding sources should also be in the interest of host supervisors, since it may dampen the susceptibility of CESEE banking systems to international spillover effects going forward. As regards the currency denomination of customer deposits at Austrian banks' CESEE subsidiaries, approximately 30% of those customer deposits were denominated in a foreign currency at the end of the second quarter of 2012, especially in euro (72%) and Swiss francs (25%).[10]

Lower state subsidies take their toll on deposits made with building and loan associations. With a market share of 6.5% in June 2012,[11] savings plans with building and loan associations are popular savings instruments in Austria. However, the fiscal austerity package agreed by the government in March 2012 also includes the halving of state subsidies on deposits accumulated under such savings plans. Conjointly with the current unfavorable interest environment, this has already led to a moderate decline in new business.

Chart 21

Customer Funding Gaps at CESEE Subsidiaries of Austrian Banks



Source: OeNB.

Liquidity Situation Shows Signs of Improvement

On a European level the liquidity pressure for banks has eased substantially since its peak levels in late autumn 2011. In late 2011 funding markets tightened up almost entirely due to the high level of market uncertainty caused by the European sovereign debt crisis. The ECB has since introduced several monetary policy measures that were instrumental in improving the liquidity and funding conditions of the European banks. Above all, the ECB allotted a total volume of EUR 1.02 trillion in two supplementary longer-term refinancing operations with a 3-year maturity, conducted in December 2011 and February 2012. In addition, the substitution of TARGET2 balances for market funding has shielded banking systems which had relied on fragile funding sources (such as unsecured interbank markets) against rollover risks. Furthermore, the ECB lowered minimum reserve requirements from 2% to 1% of credit institutions' reserve base, since minimum reserves were no longer needed to enlarge the demand for central bank reserves, which used to be one of their roles in the operational framework for monetary policy implementation.

More conservative liquidity risk profile also reflects heightened market uncertainty

Austrian banks participated in the ECB's supplementary longer-term refinancing operations with a total volume of EUR 15.7 billion, which corresponds to 1.5% of the total allotted volume, well below the

[10] *Data on the currency distribution of deposits are based only on subsidiaries of the top 3 Austrian banking groups.*

[11] *Market share measured by the outstanding amount of deposits by domestic customers (nonbanks) in euro and foreign currency.*

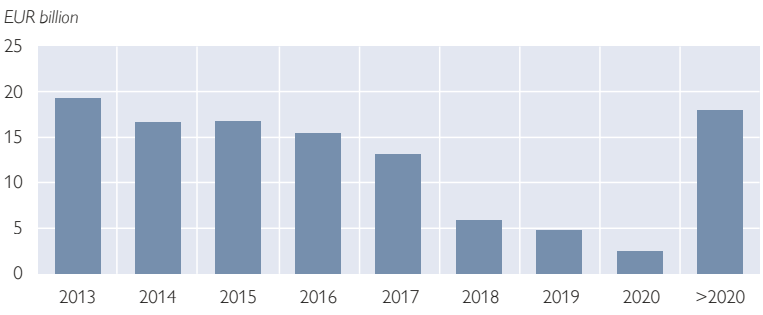
proportionate share of Austria in the Eurosystem (3.8%[12]). Banks reported that the additional liquidity was mainly used to increase the liquidity buffers as a precautionary measure. In addition, they achieved a price advantage by replacing other more expensive refinancing instruments and tender allotments with shorter maturities, thus reducing the demand for main refinancing operations. Several banks reported that they intended to redeem parts of the ECB's supplementary funding after the first year. Since May 2012 the cumulated net funding gap of the 30 largest Austrian banks, 12 months ahead before money market operations, has increased from a historically low level of EUR 26 billion to EUR 34 billion, which is still below the long-term average, mainly due to an increase in financial investments planned for the next 12 months. In the unsecured money markets, the aggregated net position of Austrian banks is positive three months ahead. The net position of issuances 12 months ahead narrowed slightly but remains clearly negative. The additional liquidity that can be realized within the next 12 months after deduction of funding gaps (counterbalancing capacity) increased to roughly EUR 100 billion (May 2012) since the beginning of 2012 and has been stable ever since (October 2012). This buffer level exceeds the long-term average and can be mostly attributed to an increase in liquid assets (cash and unencumbered securities of higher quality).

As regards the funding situation in foreign currencies, banks narrowed their liquidity gaps in U.S. dollar and Swiss franc funding. Nevertheless, banks ought to continue their efforts to reduce their U.S. dollar and Swiss franc legacy positions, lengthen funding tenors and diversify funding instruments and counterparties.

Debt issuance activity remained at relatively low levels, which can be partly explained by the use of ECB funding. Nevertheless, existing rollover needs remain. Within new issuances a structural shift towards secured issuances (covered bonds, *Pfandbriefe*) can be observed at the expense of senior unsecured bond issuances. Although asset encumbrance levels for Austrian banks are relatively low compared to their European peers, the favorable treatment of covered bonds in the new proposed liquidity regulation and the increased market demand for covered bonds might lead to higher levels in the future. As shown in chart 22, the top 6 Austrian banks will have to refinance a material amount of outstanding debt within the next years, in competition with the rollover needs of other banking systems.

Chart 22

Refinancing Needs of the Top 6 Austrian Banks



Source: OeNB.

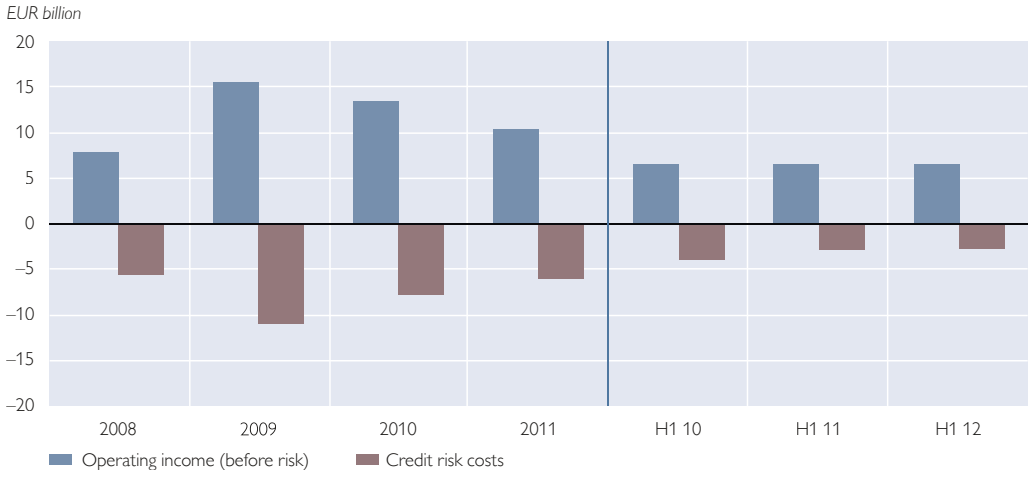
Profitability Indicators Distorted by One-Off Effects

Lower net interest income and risk provisioning burdened the aggregate profitability of the Austrian banking system during the first half of 2012. Provisions set aside by Austrian banks to cover credit risks in their loan portfolios amounted to EUR 2.7 billion on a consolidated level in the first six months of 2012 (see chart 23).

[12] *Measured in terms of consolidated total assets.*

Chart 23

Operating Income (before risk) and Credit Risk Cost of Austrian Banks (consolidated)



Source: OeNB

This is approximately 5.5% lower than in the first half of the preceding year and thus helped improve profitability in relative term, but remains a substantial factor that drags on overall profitability. At the same time, net interest income, which has traditionally accounted for more than half of total operating income (51.5% in H1 2012), deteriorated slightly (–3.9% in H1 2012 compared to H1 2011), in line with commission and fee income, which also decreased by 2.8% compared to the first half of 2011. It remains to be seen how a long lasting low interest environment will affect interest margins.

Net profits after taxes were upward-biased because of extraordinary revenue items related to capital measures of several large Austrian banks. The stable operating profit (+1% in H1 2011 year on year) and net profit after taxes of roughly EUR 3 billion (+4.6%) for the banking system should therefore be interpreted with caution. After adjusting for the stated one-off effects, which are related to hybrid capital buy-backs and similar one-off measures, the banking system generated a consolidated return on assets after taxes of nearly 0.4% during the first three quarters of 2012. Given the more difficult macroeconomic conditions and the challenging international environment toward the end of 2012, as well as seasonal effects, the return on assets for the entire year is likely to be lower than this level, though.

Slightly weaker adjusted profitability than in the first half of 2011

The CESEE business was again a substantial net contributor to the overall profitability of the Austrian banking system in the first half of 2012. Similar to previous years, the after-tax return on assets of Austrian banks' CESEE subsidiaries (1.0%) was significantly above that recorded by Austrian banks on an unconsolidated basis (0.4%). However, the higher profitability of CESEE subsidiaries needs to be qualified by pointing at three caveats that may apply: First, the CESEE business is in general associated with higher risks, which imply higher expected returns for the CESEE operations on average. Second, the comparison of the two return figures is influenced by the pricing of intragroup liquidity transfers. Lastly, some admin-

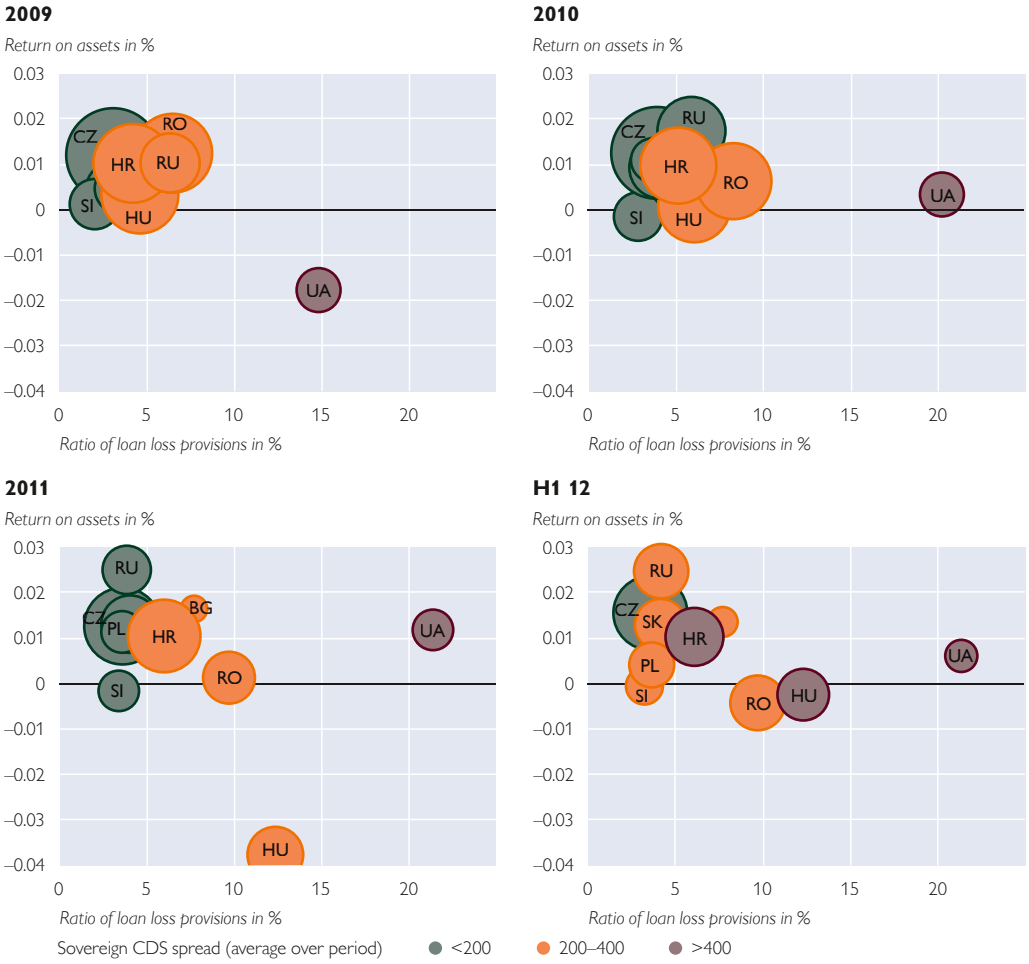
istrative expenses that are related to the CESEE subsidiaries are covered by headquarters in Vienna. Compared to 2011, the average return on assets of CESEE subsidiaries was higher than for the entire year 2011 (0.7%) but lower than the level recorded during the first half of 2011 (1.2%) when macroeconomic conditions in the CESEE region were still more favorable on average.

Increasingly heterogeneous performance of CESEE subsidiaries

On a country level, the performance of Austrian CESEE subsidiaries has become more heterogeneous in recent years. While it is important to highlight the remarkably resilient aggregate profitability of Austrian banks' CESEE subsidiaries as a whole over the past few years, the aggregate numbers mask country differences that have become clearer over time. As chart 24 shows, business operations in some countries (most notably the Czech Republic, Slovakia, Croatia and Russia) have yielded relatively stable net returns ever since 2009, while the performance in other countries has been more uneven, in particular in the case of countries with elevated country risks, as proxied by their sovereign CDS spreads in chart 24.

Chart 24

Profitability and Loan Loss Provisions of Austrian Banks' CESEE Subsidiaries



Source: OeNB.

Note: The size of the data points represents the total exposure of Austrian banks to the respective country (ultimate risk basis).

Profitability in the domestic banking market remains rather subdued. Local smaller banks[13] saw their after-tax return on assets decrease from 0.4% in the first half of 2011 to 0.3% in the first half of 2012. This reduction was mainly due to lower net interest income, which plays a greater role for smaller banks than for large and regional banks. Similarly, return on equity was lower in the first half of 2012 for domestic banking operations (4.8%) than for operations at CESEE subsidiaries (8.7%). Profitability remained restrained in the third quarter of 2012. Unconsolidated operating profit was about 8.8% lower than a year ago in September 2012. However, because risk costs declined as well, expectations on the unconsolidated return on assets remain unchanged at the level of June 2012 (0.4% for the total banking sector).

Capital Ratios Continue to Increase in 2012

The tier 1 ratio of the Austrian banking system continued to improve in early 2012, partly due to reductions in risk-weighted assets (RWA). After its low in the second quarter of 2008, the aggregate tier 1 capital ratio (capital adequacy ratio) of all Austrian banks rose steadily and reached 10.6% (13.7%) in the second quarter of 2012. The increase of the aggregate tier 1 capital ratio can be mainly attributed to two effects. First, the volume of eligible tier 1 capital has risen by more than a third since the third quarter of 2008, reflecting internal capital increases (private placements, capital injections from the parent group, retained earnings and other measures) as well as government measures under the bank stabilization package worth EUR 8.7 billion (or about half of the increase in eligible tier 1 capital). Second, in a direct response to the financial crisis, banks were reducing their risk-weighted assets until the fourth quarter of 2009 (see chart 25), inter alia by streamlining their balance sheets and cutting off-balance sheet activities. While there was a slight increase in RWA in 2010, the trend of RWA reductions has continued ever since: RWA shrank by 1.7% in the first half of 2012, with the aggregate rate masking divergent developments of the top 6 banks on the one hand (–4.4%) and the rest of the banking sector on the other hand (+3.0%). By international comparison Austrian banks still have a rather high ratio of risk-weighted assets to total assets, reflecting a low leverage.

Despite improvement, further capital increases required

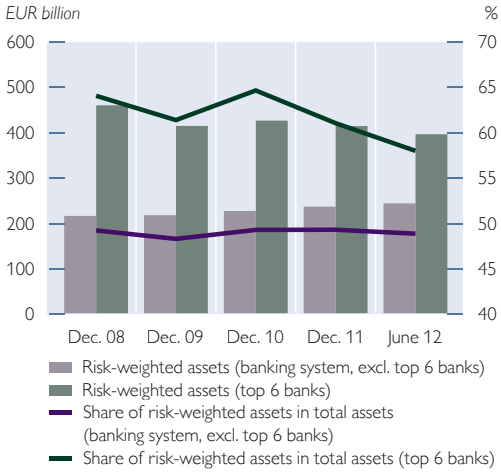
The Austrian banking sector's aggregate tier 1 capital ratio is dominated by the country's top 6 banks, which are less adequately capitalized than their international peers.[14] Even though the top 6 banks have continually improved their tier 1 capital ratios in recent years, the gap between them and their peers has remained, as the latter also strengthened their capital positions considerably. In the case of the top 6 banks and their peers with a relevant CESEE exposure, the gap widened from 1.2 percentage points in 2009 to 1.8 percentage points by mid-2012 (10.2% versus 12.1% on average; see chart 26). The top 3 banks, which had managed to narrow their gap somewhat in the second half of 2011, fell behind again, mainly resulting from a marked increase in the peer group's

[13] *The sector of local smaller banks includes certain joint stock companies, the savings banks without Erste Group and Erste Bank, the Raiffeisen credit cooperatives without Raiffeisen Zentralbank (RZB), the regional Raiffeisenlandesbank cooperatives and holdings, as well as Volksbank credit cooperatives without Volksbanken AG (VBAG).*

[14] *The two peer groups analyzed here consist of, first, 12 European banks with relevant CESEE exposure and, second, of 31 European banks with similar business models.*

Chart 25

Risk-Weighted Assets of Austrian Banks

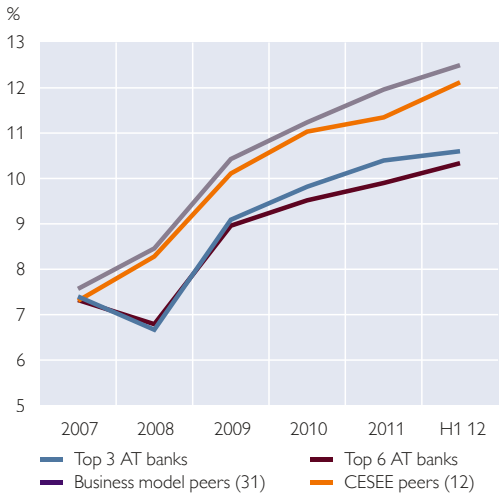


Source: OeNB.

Smaller local banks with above-average capitalization

Chart 26

Tier 1 Ratio of Large Austrian Banks Compared with European Peers



Source: OeNB, Bankscope.

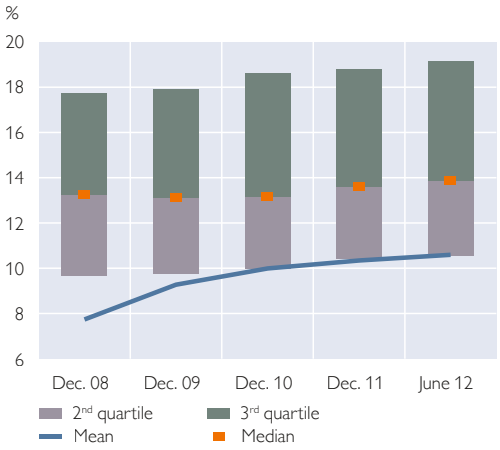
aggregate tier 1 ratio in the first half of 2012 (+0.8 percentage points). The top 3 banks' aggregate tier 1 ratio is now 1.5 percentage points below the CESEE-related peer ratio, compared with 1.0 percentage points at the end of 2009. Nevertheless, the two large majority Austrian-owned banks that participated in the recapitalization exercise of the European Banking Authority (EBA) were able to meet the core tier 1 capital requirements as of end-June 2012. It is also worth noting that the leverage of large Austrian banks (i.e. based on total assets instead of risk-weighted assets) is significantly lower than that of their peer groups (15.9 for the top 3 banks compared to 26.1 for CESEE peers and 28.0 for European peers). A low(er) leverage is an important indicator of financial stability as it is independent from banks' internal models and/or changes in external rating.

The distribution of capital ratios among Austrian banks highlights the more solid capitalization of local and regional banks compared to large banks. At the end of the second quarter of 2012, the median tier 1 capital ratio of all Austrian banks stood at 13.9% and thus above the aggregate mean (see chart 27). The higher median ratio essentially reflects the high number of local and regional banks with above-average capitalization that operate in Austria alongside the few large banks which dominate the industry. Half of all Austrian banks (i.e. the second and third quartile) post tier 1 capital ratios between 10.6% and 19.1%.

At the level of CESEE subsidiaries, capital ratios were for the most part well above the regulatory minimum requirements set by host countries. The RWA-weighted average tier 1 ratio (capital adequacy ratio) of CESEE subsidiaries increased to 14.2% (16.4%) during the first half of 2012, reflecting a continuously improving capital base of Austrian subsidiaries. Both ratios were significantly higher in the NMS-2007 and SEE subregions (tier 1 ratios of 16.4% and 18.0%) than in NMS-2004 and CIS subsidiaries, partly due to stricter regulatory minimum capital requirements and elevated country risks.

Chart 27

Aggregate Tier 1 Ratio of Austrian Banks



Source: OeNB.

Given their overall risk profile, tighter regulatory requirements in the future and the eventual repayment of government support measures, large Austrian banks ought to increase their capital ratios in the short to medium term. In particular, large Austrian banking groups that are among the key market players in the CESEE region should strive to close the gap with their international peers. The repayment of government support measures over the next few years is likely to be challenging and may require additional capital from external sources.

Current Market Assessment of Austrian Banks Should Not Lead to Complacency

The market assessment for euro area sovereigns and financial institutions showed signs of improvement after the ECB announced further measures to mitigate a systemic crisis. The intensification of the sovereign debt crisis in several euro area countries in the first half of 2012, the implementation risk of policy measures on a European and national level, the deteriorated economic outlook, as well as the challenging market environment for financial institutions had contributed to a sustained period of negative market assessment. An overall improvement in market sentiment was notable only after ECB announcements of further action, including Outright Monetary Transactions. However, the overall level of confidence remains relatively low, given the still fragile situation and heightened uncertainty.

ECB announcement as a "tranquilizer" for markets

The market valuation of listed Austrian financial institutions remains volatile at relatively low levels. The price-to-book ratios of listed Austrian banks continued to be subdued but exceeded those of European peers. Above all, the market assessment incorporates the comparatively limited exposure of Austrian banks to euro area EU/IMF program countries and their exposure to the CESEE region, where GDP is still expected to grow at a faster pace than in Western European economies.

Market participants and ratings agencies continued to voice concerns about the relatively low capitalization of large Austrian banks and the dependence of their CESEE subsidiaries on parent funding. These two concerns were addressed by the supervisory measures to strengthen the sustainability of the business models of large internationally active Austrian banks. A resilient banking system as well as solid public finances are necessary conditions for financial stability and help to contain a vicious circle between banks and the sovereigns. Therefore, the current market assessment should not lead to complacency and be rather seen as a window of opportunity to strengthen resilience further.

In the 2012 Article IV consultation, the IMF welcomed the introduction of the "OeNB/FMA sustainability package" and pointed at the need to strengthen early intervention powers. The Article IV staff report highlights the still deteriorating asset quality and subdued profit-

ability[15] of Austrian banks, while taking note of recent improvements in their capitalization and liquidity position. With regard to financial sector policies, the IMF recommends to proceed swiftly with the strengthening of early intervention powers and to revamp plans to restructure medium-sized banks that received public support to allow more efficient asset disposals. In addition, Austrian authorities were advised to strengthen the institutional framework regarding financial sector policies, in particular with respect to macroprudential policy.

Box 1

Banking Union: Great Leap Forward for Banking Supervision in Europe?

The ongoing financial crisis in Europe has shown that further steps are needed to address the specific risks within the euro area. Closer economic and financial integration due to the common currency have also increased the possibility of cross-border spillover effects in the event of bank crises. Moreover, recent developments point to an increasing risk of fragmentation of banking markets within the EU, with the potential of undermining the single market for financial services. In the area of banking supervision the crisis has shown that coordination between supervisory authorities is not enough to tackle these issues and that there is a need for more common decision-making. Last but not least, developments in the EU in recent years make it necessary to break the link between sovereign debt and bank debt, and the vicious circle of interdependence and contagion between them.

Consequently, following the euro area summit of June 29, 2012, the European Commission was asked to present proposals on the basis of Article 127(6) Treaty on the Functioning of the European Union (TFEU) for a single supervisory mechanism. Given an effective single supervisory mechanism, involving the ECB, for banks in the euro area, the European Stability Mechanism (ESM) would have the possibility to recapitalize banks directly. Accordingly, the European Commission issued on September 12, 2012, a communication on the establishment of a "banking union" consisting of a single supervisory mechanism (SSM), a common system for deposit guarantees and an integrated crisis management framework. The communication was accompanied by two legislative proposals, one for the setting up of a SSM and one for adaptations to the Regulation setting up the European Banking Authority (EBA).

As a first step towards a banking union, the proposal creates a SSM by conferring certain key supervisory tasks for the prudential supervision of credit institutions in the euro area to the ECB. In order to provide strong and consistent supervision the ECB will cooperate closely with national supervisors and the EBA. All tasks not conferred in the regulation on the ECB, such as consumer protection and the fight against money laundering for example, will remain the competence of national supervisors. Furthermore, for non-euro area Member States that wish to participate in the SSM there will be the possibility to enter into a close supervisory cooperation with the ECB subject to meeting specific conditions.

The proposal for the establishment of the SSM is an important step towards a genuine economic and monetary union in Europe. However, the SSM will have to be reinforced with a common deposit guarantee scheme and an integrated crisis management framework, as such tools constitute necessary pillars for a successful banking union. Thus, a roadmap, supported by clear political commitment towards putting in place all three pillars within a clearly defined timeframe, needs to be developed. Additionally, a realistic timetable is needed regarding the transfer of supervisory powers over all banks to the ECB in order to ascertain the maintenance of high supervisory standards. As regards the operational setup of the SSM, it will be

[15] *Source: IMF. 2012. Austria: 2012 Article IV Consultation Staff Report, www.imf.org/external/pubs/ft/scr/2012/cr12251.pdf (retrieved on November 27, 2012).*

crucial to avoid overly bureaucratic structures and to provide for an effective and efficient cooperation framework between the ECB and national competent authorities as close cooperation will be the key for success of the new European supervisory mechanism, whose establishment in such a short timeframe constitutes an eminent challenge.

Sound Financial Market Infrastructure and Improvement of Regulation

The OeNB is closely monitoring new developments regarding retail payment systems in Austria. For instance, an increasing number of market participants are offering contactless payment services based on cards or mobile phones. No payment system disturbances of systemic importance were recorded in the Austrian financial market in the first three quarters of 2012.

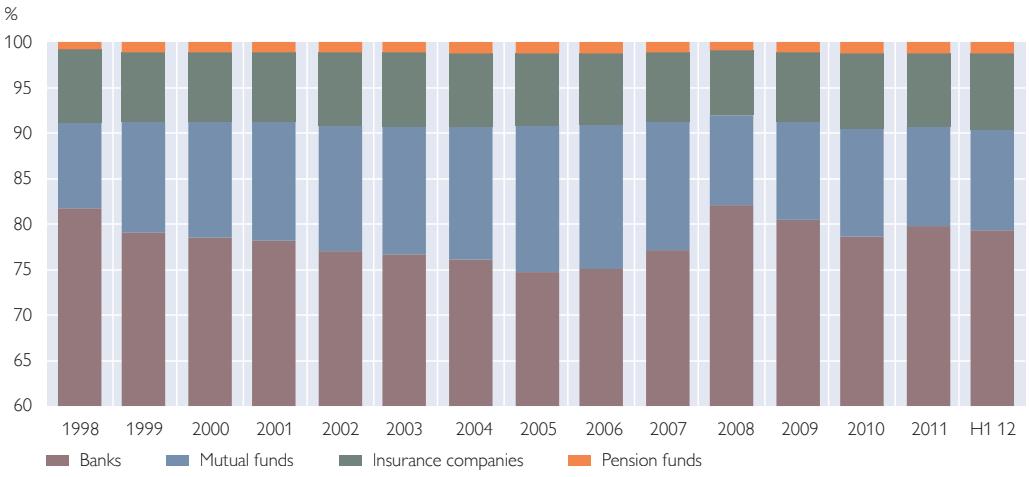
In order to improve the stability of financial market infrastructures, a new regulation has been implemented in Austrian law. The regulation on over-the-counter (OTC) derivatives, central counterparties and trade repositories[16] (also known as EMIR), which introduces a harmonized framework for central counterparties as well as reporting and clearing obligations for OTC derivatives, was transposed into Austrian law in October 2012 through an enforcement act. The FMA is designated as the competent authority for licensing central counterparties in Austria; however, the enforcement act provides for a close cooperation between the FMA and the OeNB in this context. Furthermore, the SEPA regulation[17] was implemented in Austrian law in November 2012 by an amendment of the Payment Services Act. In this context, the FMA was designated as the competent authority and the OeNB is expected to fulfill an expert function.

EMIR finds its way into Austrian law

Even though financial intermediation in Austria is dominated by the banking sector (see chart 28), nonbank financial

Chart 28

Distribution of Financial Intermediation in Austria



Source: OeNB.

[16] *Regulation (EU) No 648/2012.*

[17] *Regulation (EU) No 260/2012.*

Banks dominate the financial sector but nonbank financial institutions fulfill important additional functions

institutions fulfill an irreplaceable function within the financial system. Approximately 80% of financial market intermediation in Austria is performed by banks. Nonbank financial intermediation via insurance companies, pension funds, etc. represented just under EUR 240 billion in terms of total assets as of end-2011. Shadow banking, an increasingly important financial stability concern at the global stage, plays a below-average role in Austria,[18] but close monitoring of future developments seems warranted nonetheless.

Other Financial Intermediaries Face Crisis-Induced Challenges

Sovereign Debt Crisis Weighs on Insurance Companies and Mutual Funds

Sustained low interest environment as a challenge for insurance companies

Market conditions and cautious private investors create a challenging environment for the Austrian nonbank financial intermediaries. Life insurers and pension funds have started to feel the impact of the low interest rate environment, especially when it comes to product portfolios with interest rate guarantees for long periods. Insurers and pension funds as the largest group of institutional investors have been affected by low interest rates and the resulting reduction of investment earnings. Even though the negative effects appear rather slowly, given that only new premiums and expired investments are invested under current market interest rates, institutions are required to adjust to the changed environment and reconsider their investment strategies. The FMA reacted to the low interest rate environment with a reduction of the maximum guaranteed interest rate from 2% to 1.75% for new business of classical life insurances to be underwritten after December 20, 2012.

Life insurance business is stressed by several other factors. In addition to the potential problems resulting from the low interest rate environment, shrinking investment earnings and the weakened economic environment, life insurance business faced a continuous decrease in premium income over the last quarters (Q1 and Q2 2012: –8% compared to last year's period). This development was evident from the decrease of single and current premiums in mixed life insurance as well as in equity/index-linked insurance. Lower guaranteed interest rates and the commitment period of at least 15 years for products with single premiums as well as expensive lapse conditions discourage new business.

Non-life and health insurers were less affected by the weaker macroeconomic environment. Property and casualty insurance as well as health insurance remained stable in Austria. Both non-life segments were able to increase their premium income compared to the preceding year (Q1 and Q2 2012, property and casualty insurers: +5%; health insurers: +3%). The combined ratio[19] for property and casualty insurance stayed steadily at around 90% and increased slightly by 2 percentage points compared to the previous year, due to an increase in the loss ratio.[20]

Higher profitability in CESEE insurance activities

Foreign operations of Austrian insurance companies faced a very similar business environment as the banking sector. Austrian insurance groups are prominent investors in CESEE, but their future growth in Austria and CESEE is cur-

[18] *Source: ECB survey including data from other regions as of end 2010.*

[19] *The combined ratio, defined as insurance expenses to earned premiums, should be less than 100% for efficient companies.*

[20] *The loss ratio is defined as incurred losses divided by earned premiums.*

rently overshadowed by financial market uncertainty. In 2011 the CESEE subsidiaries of Austrian insurance companies increased their premium income by 5.7% and their net result (profit on ordinary activities) by 46% (both year on year). However, as in the banking sector, higher profitability is accompanied by heightened risks such as macroeconomic or legal risk. Moreover, growth prospects were revised downward in the course of 2012.

Pension funds in Austria continued to grow and generated a slightly positive return. In June 2012 Austrian pension funds had total assets under management of EUR 15.5 billion, almost 4% more than a year ago. With a yearly performance of 1.2% business operations turned out to be positive but below average compared to institutional mutual funds (2.1%). Austrian pension funds are mainly invested in bonds (52%) and thereof 51% in government securities, which makes them vulnerable to the low interest rates of core government securities in general and even more so in case of a further intensification of the European sovereign debt crisis (see table 1).

Private pension plans are becoming less attractive as subsidies have been cut by half. The premium income of state-subsidized personal pension plans – part of the third pillar of the Austrian pension system – stagnated in 2011 with a yearly growth rate of 0.5%. Furthermore in 2012, subsidies were halved, making private retirement provisions less attractive.

Austrian mutual funds experienced divergent developments in different asset classes. Overall, assets under management by mutual funds declined by 3.5% year on year, to EUR 140 billion at the end of the second quarter of 2012. The decline was mainly driven by retail funds because private investors seemed to remain cautious and invested more in tangible assets or financial products that offer a deposit guarantee. The overall annual investment performance of mutual funds in Austria in the first half of 2012 was positive at 1.8% supported by a handsome return of bond funds (+5.1%) and a negative performance of equity funds (–8.4%).

A new regulation for exchange-traded funds (ETFs) and undertakings for collective investments in transferable securities (UCITS) aims at improving investor protection and cross-border harmonization. In July 2012, the European Securities and Markets Authority (ESMA) published guidelines on ETFs and other UCITS issues. These guidelines will apply to national securities markets regulators and UCITS management companies and include a strengthening of investor protection as well as greater harmonization of regulatory practices within Europe. Besides improving the content of the information communicated to investors, the guidelines contain quantitative and qualitative criteria for collateralized transactions such as securities lending arrangements, repo and reverse repo transactions and OTC financial derivative transactions.

Vienna Stock Exchange – Lower Prices and Volume in the Wake of the Global Financial Crisis

The global financial crisis and the subsequent sovereign debt crisis had a severe impact on global stock markets, and the Vienna stock exchange was hit particularly hard. Heightened market uncertainty and volatility has led to increased risk aversion of market participants over the last few years, which is reflected in a broad reduction of market capitalization around the globe (see chart 29). Especially countries in the focus of the sovereign debt crisis were affected. The Vienna stock exchange also suf-

Bond funds on the upswing

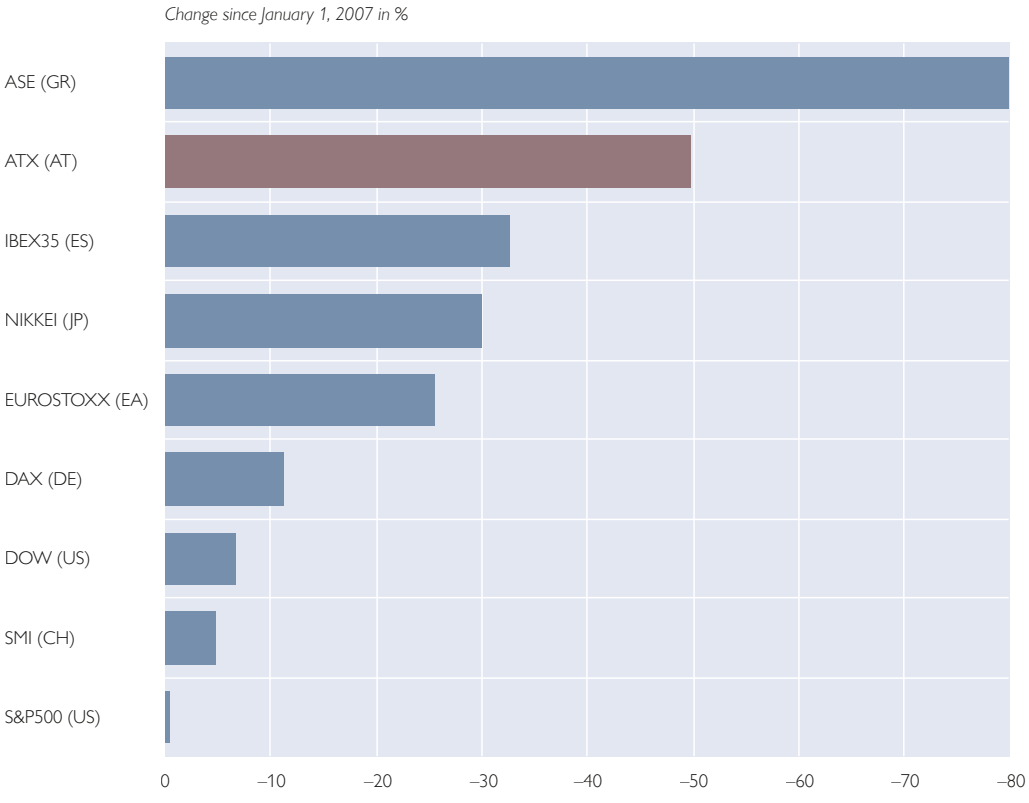
fered material losses, mainly for two reasons: First, the domestic market index is dominated by stocks of financial institutions which underperformed since the beginning of the financial crisis. Second, the attractiveness of stock market investments was reduced by the introduction of a capital gains tax in Austria that is not linked to the holding period of the security.

Lower turnover at Vienna stock exchange

Issuance activity on the Vienna stock exchange was rather limited in recent quarters and market turnover tumbled. The turnover of the Austrian Traded Index (ATX) went down markedly over the past years, reflecting a relative loss of importance in an international context (see chart 30). As a gateway towards the CESEE region, the domestic stock exchange also faces active competition within the CEE Stock Exchange Group and from the Warsaw stock exchange. Market transactions such as initial public offerings or capital increases virtually came to a standstill. At the same time, the bond market, in particular for nonfinancial corporate bonds, developed positively as investors were attracted by comparatively high interest rates as opposed to seemingly safer investment alternatives.

Chart 29

Stock Exchange Market Capitalization

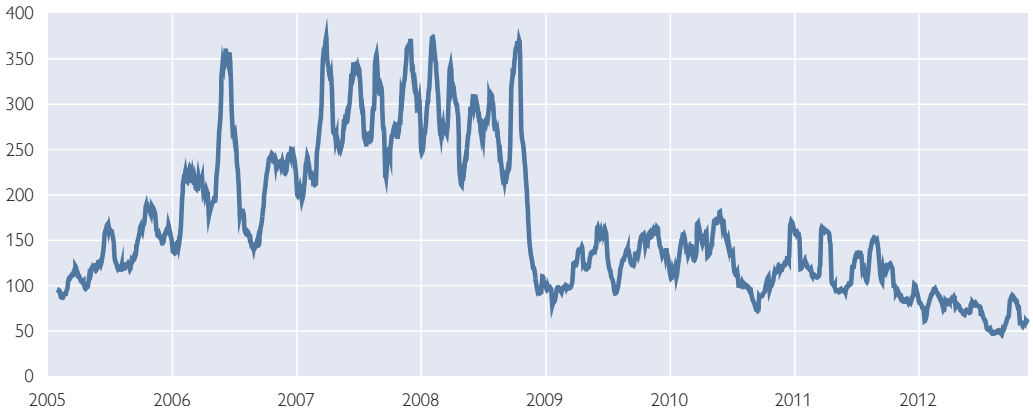


Source: Bloomberg.

Chart 30

Average Daily Turnover of the Austrian Traded Index

30-day moving average in EUR million



Source: Bloomberg.

Special Topics

How Do Austrian Banks Fund Their Swiss Franc Exposure?

Raphael A. Auer,
Sébastien Kraenzlin,
David Liebeg[1]

Austrian banks have traditionally issued large volumes of Swiss franc-denominated loans. Although new issuance has virtually stopped since 2008, the outstanding volume (CHF 81 billion at mid-2012) will continue to pose a challenge to financial stability at least in the coming decade. This study examines how Austrian banks have refinanced their Swiss franc positions and how this changed with the onset of the financial crisis. We document the importance and evolution of three main funding sources: (1) the secured and unsecured interbank money market, (2) Swiss franc-denominated bond issuances, and (3) central bank financing operations. Our findings are that while activity in the unsecured money market almost came to a halt around the collapse of Lehman brothers and the issuance of Swiss franc-denominated bonds also decreased, the cross-border repo market proved resilient. Moreover, an important role in dealing with the funding drought was played by central bank operations, namely repo operations by the Swiss National Bank (SNB) and swap facilities provided by the SNB and the ECB.

JEL classification: E52, E58, F33, F36, G21
Keywords: foreign currency loan, banking supervision, banking sector stability, lender of last resort, refinancing, interbank market

1 Swiss Franc-Denominated Loans Granted by Austrian Banks – an Overview

Foreign currency lending started to become popular among nonbank borrowers, especially households, in Austria in the mid-1990s. While the share of foreign currency lending made up only 1% of total loans to households at the beginning of 1995, it had risen to more than 31% by mid-2006 and had hovered around 30% until mid-2011. Due to the strong appreciation of the Swiss franc until the summer of 2011, the peak in the outstanding volume (in absolute terms) was reached in July 2011, when EUR 62 billion of loans to domestic nonbanks were denominated in a foreign currency, primarily in Swiss francs. Loans to households accounted for the lion's share – EUR 42 billion – of this amount. Real demand for new foreign currency loans started to decline in August 2008, which can be attributed to the financial crisis, to developments in foreign exchange markets that brought to the fore the risks of foreign currency loans, and also to Austrian authorities starting to implement a stricter stance on foreign currency lending. Nevertheless, the strong appreciation of the Swiss franc in 2010 and 2011 increased the euro value of the outstanding loans and thus prevented a noticeable decline in outstanding volumes.

Now these outstanding volumes are to a large extent a legacy of the past. Over the past few years, various supervisory initiatives in Austria succeeded in almost completely stopping the issuance of new Swiss franc-denominated loans: the "Extension of the FMA Minimum Standards for Granting and Managing Foreign Currency Loans and Loans with Repayment Vehicles" issued in spring 2010 requests banks – inter alia – to restrict new foreign currency lending to domestic households with a natural hedge or with the highest credit-

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worthiness. However, due to long residual terms to maturity, the outstanding volume will continue to be a challenge to financial stability in Austria: Three-quarters of foreign currency loans of domestic households and nonfinancial corporations outstanding in mid-2011 had a remaining maturity of more than five years, and more than 80% of these loans were bullet loans (i.e. loans whose principal is paid back at the end of the loan term). As far as Central, Eastern and Southeastern Europe (CESEE) and the countries of the Commonwealth of Independent States (CIS) are concerned, Austrian banks committed themselves under the "Guiding Principles" (issued by the Austrian Financial Market Authority (FMA) and the OeNB in early 2010) to refrain from granting new non-euro-denominated (non-U.S. dollar-denominated in CIS) foreign currency loans to unhedged households and small and medium-sized enterprises.

Foreign currency loans taken out by Austrian households also have another distinctive feature: More than 70% are bullet loans linked to repayment vehicles. Borrowers pay monthly instalments for investment in separate repayment vehicles (predominantly capital market-orientated types of investment, e.g. mutual funds or life insurance contracts), which are expected to cover the total outstanding loan at maturity. Therefore, private foreign currency borrowers in Austria very often act as carry traders without having at their disposal the methods and knowledge of professional carry traders, though (for more details on the risks of foreign currency lending in Austria see e.g. Beer et al., 2010; Boss, 2003; and Waschiczek, 2002).

The largest share of foreign currency loans to Austrian nonbank borrowers was and still is denominated in Swiss francs; there was only one short period at the beginning of the 2000s when loans denominated in Japanese yen were nearly as popular. Since mid-2004, Swiss franc loans have accounted for 85% or more of the total of foreign currency loans to Austrian nonbanks (and for solidly over 90% in the case of households). At the end of June 2012 the total volume of Swiss franc loans to nonbank borrowers made up EUR 47 billion (CHF 56 billion), of which EUR 34 billion (CHF 41 billion) were owed by households.

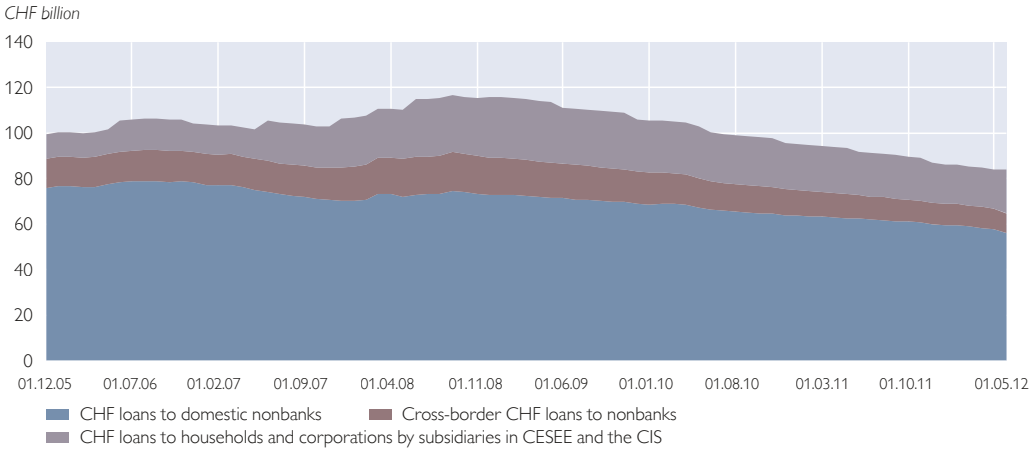
Besides the foreign currency loans to domestic customers, Austrian banks also have a substantial foreign currency exposure in CESEE and the CIS (see Pann et al., 2010). In CESEE and the CIS the Swiss franc plays a less prominent role, however. Of the EUR 86 billion of foreign currency loans granted by Austrian subsidiaries to households and nonfinancial corporations by mid-2012, EUR 16 billion (CHF 19 billion) or 19% were denominated in Swiss francs. Euro loans, on the other hand, accounted for EUR 50 billion (58%) and U.S. dollar loans for EUR 19 billion (22%).

Cross-border loans are the third aspect to be considered when analyzing Swiss franc-denominated lending by Austrian banks. At the end of June 2012 the total volume of cross-border loans outstanding to foreign nonbanks was EUR 7 billion (CHF 9 billion), of which EUR 2 billion (CHF 2 billion) went to the CESEE and CIS region and EUR 3 billion (CHF 4 billion) to Switzerland.

Altogether, in mid-2012, the outstanding amount of Swiss franc loans granted by Austrian banks to nonbanks came to EUR 68 billion (CHF 81 billion), which due to the lack of a customer deposit base in Swiss francs needs to be refinanced by various other (non-deposit) sources that we will describe in the following. Chart 1 illus-

Chart 1

Swiss Franc-Denominated Loans Granted by Austrian Banks to Nonbank Borrowers from End-2005 to Mid-2012



Source: OeNB.

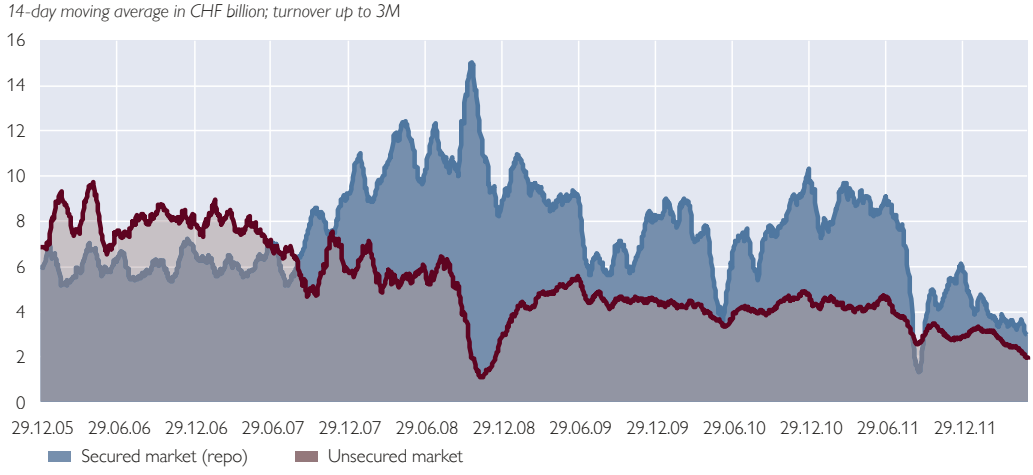
trates the evolution of the outstanding volume of Swiss franc loans granted by Austrian banks to nonbanks in Austria as well as in the CESEE and CIS region.

2 The Breakdown of the Unsecured Swiss Franc Interbank Money Market

Banks can refinance their loans through nonbank deposits or through the capital and money markets. Anecdotal evidence suggests that before the outbreak of the financial turmoil banks used the unsecured interbank money market to refinance a large part of their Swiss franc loans. However, against the backdrop of the global financial crisis and the fear of counterparty default risk, activity in the unsecured interbank money market collapsed, leading to a

Chart 2

Turnover in the Secured and Unsecured Swiss Franc Interbank Money Market



Source: SNB, Eurex.

higher reliance on the other financing segments.

Chart 2 plots the turnover in the unsecured (blue area) and secured (orange area) interbank money market in Swiss francs. The two money market segments show a diametrically opposite development until 2011, which was most pronounced at the height of the crisis in September 2008: Turnover plummeted in the Swiss franc unsecured interbank money market, whereas it doubled in the repo market.[2] Thereafter activity also decreased in the repo market, mainly because of the generous liquidity provision by the SNB and the low level of interest rates. Up to date there is no evidence that the relative importance of these two markets changed to the opposite. Based on turnover data we find that the Swiss franc repo market has proven to be a crisis-resilient financing source. Banks with access to the repo market in Switzerland were thus able to bridge unexpected liquidity outflows resulting from a collapse of the unsecured interbank money market.

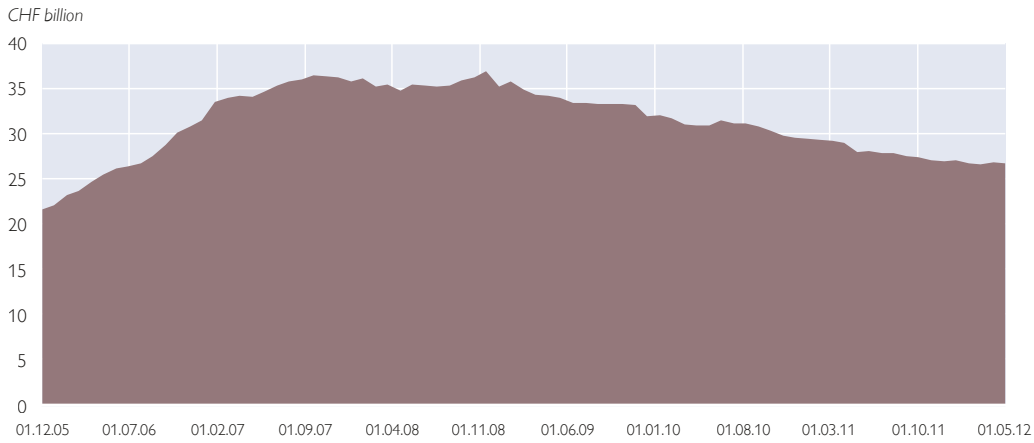
3 Capital Market Issuance – an Important Source of Funding

A sizeable part of Swiss franc loans is funded by issuances denominated in Swiss francs. At the end of June 2012 a total volume of CHF 26 billion in Swiss franc-denominated capital market issuances by Austrian banks was outstanding. In fact, since 2007 this form of funding has accounted for about 30% (and slightly more) of the total of Swiss franc-denominated loans granted to nonbank borrowers.

However, not only did the strong increase in the outstanding volume come to a halt in late 2007, since late 2008, the total outstanding volume has actually declined. The underlying reason for this decline is that currently very few new such bonds are being issued, while maturing ones are not being replaced.

Chart 3

Outstanding Volumes of Swiss Franc-Denominated Capital Market Issuances from End-2005 to Mid-2012



Source: OeNB.

[2] *Repos are concluded and settled in Switzerland via the Swiss Value Chain. The Swiss Value Chain is an integrated and automated infrastructure, which covers both trading and the settlement of the securities and cash sides. For repos, the Swiss Value Chain consists of Eurex Zurich Ltd's trading platform, SIX SIS Ltd's securities settlement system and the Swiss payments system (SIC).*

4 Secured Markets – a Reliable Source of Funding in Turbulent Times

How did Austrian banks finance their sizeable exposure amidst the breakdown of the unsecured interbank money market and the decline of Swiss franc-denominated bonds? To answer this question, we first examine the role of secured short-term funding via the Swiss repo market and the SNB's repo operations. Repo transactions are secured money market transactions in which the cash taker provides collateral in the form of securities and in return receives money from the cash provider. The delivered securities primarily serve the purpose of eliminating counterparty risk.

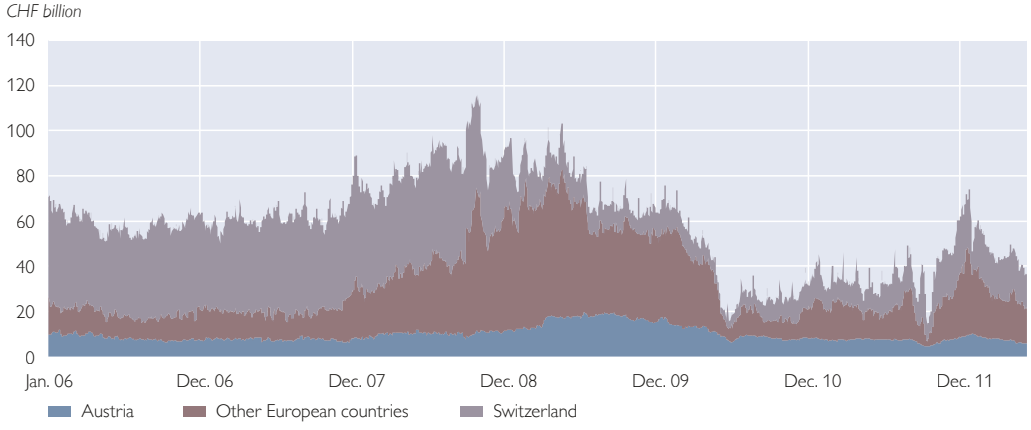
Chart 4 plots the outstanding volume in the Eurex interbank repo market – the most important secured money market in Swiss francs – as well as the outstanding volume of the SNB's repo operations. The outstanding volume is broken down by the cash takers' country of domicile (Switzerland, Austria and other European countries). As banks domiciled in Switzerland are almost exclusively providing Swiss franc liquidity the volume ascribed to Switzerland in chart 4 can be referred to as domestic transactions. Conversely, the volume related to cash takers domiciled in Austria and other European countries belongs to the cross-border repo segment.

Chart 4 thus illustrates the sizeable extent to which foreign banks relied on Swiss franc liquidity via the Swiss repo market during the financial crisis. While before August 2007 most activity in this market was domestic (i.e. between banks domiciled in Switzerland), the cross-border segment took over the lead with the onset of the financial crisis. During early and mid-2009, of the total amount outstanding of CHF 80 billion, nearly three-quarters were provided to banks domiciled outside Switzerland. The Swiss repo market thus became an internationally driven market during the financial market turmoil.

As far as Austria is concerned, two points are noteworthy. First, Austrian banks used the Swiss repo market already before the financial crisis. In the years before 2007, Austrian banks accounted for the vast majority of the cross-border market segment and also for a large share of the overall repo market.

Chart 4

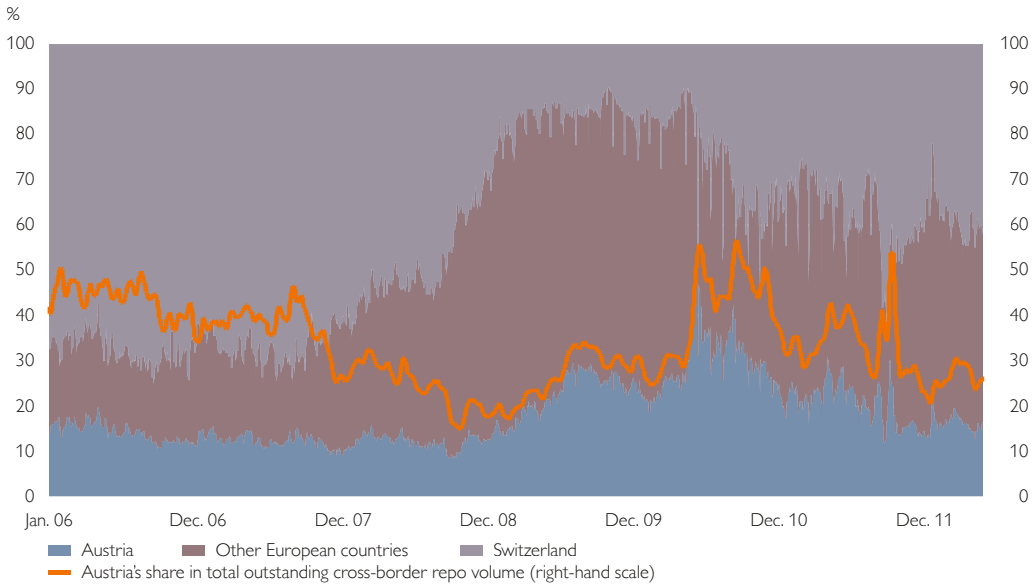
Outstanding Repo Volume (Interbank and SNB)



Source: SNB, Eurex.

Chart 5

Shares of Outstanding Repo Volumes (Interbank and SNB)



Source: SNB, Eurex.

Second, Austrian banks' use of the Swiss repo market increased during the financial crisis, and this increase was much less pronounced than the cross-border use by other European banks until mid-2010. Chart 5 highlights this dominant role, displaying the share of Austrian banks as a percentage of the total outstanding cross-border repo volume (bold line) and as a share of the total repo volume (blue area).

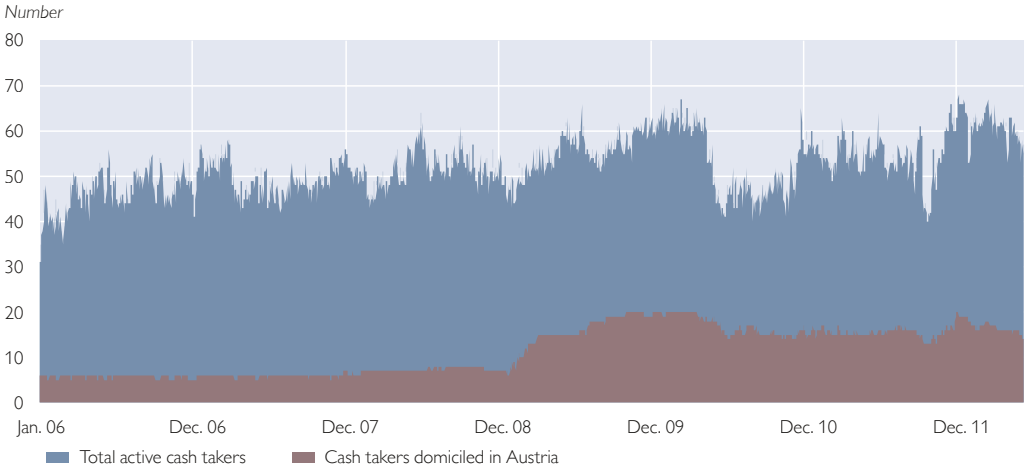
Regarding the ultimate source of Swiss franc funds, it is noteworthy that a large share of this cross-border volume in the Swiss repo market was directly provided by the SNB to banks domiciled outside Switzerland as opposed to the SNB providing funds to domestic banks, which then pass these funds on to banks domiciled outside Switzerland. Auer and Kraenzlin (2011) describe the SNB's policies in providing liquidity, highlighting that the SNB's direct provision of liquidity to banks outside Switzerland is a particular institutional feature not found in most other central banks. The original intent of allowing foreign banks to access the Swiss repo market was to reduce banks' dependence on a few large Swiss financial institutions and to improve the general liquidity in the banking system, thereby facilitating the steering of a longer-term money market rate, namely the three-month Swiss franc London Interbank Offered Rate (LIBOR) (see e.g. Kraenzlin and Nellen, 2012).

As the SNB uses the same platform as the interbank market, a large number of banks have established access not only to the SNB but also to numerous banks. While the repo system had 37 participants (of which four were domiciled outside Switzerland) in 1999, the number of participating banks had increased to 170 banks by 2012. Of these 170 banks, 59 are domiciled outside Switzerland, and of these 59 non-Swiss banks, 23 were located in Austria, 16 in Germany, and 6 in the United Kingdom.

Given that much of the secured cross-border funding came directly from the SNB, a large number of Austrian banks obtained liquidity from the

Chart 6

Swiss Repo System – Number of Participating Banks



Source: SNB, Eurex.

SNB. Chart 6 displays the number of Austrian banks that were active either in the SNB's operations or in the interbank repo market. The chart also shows that the overall number of active participants increased since the onset of the crisis. The main reason is that the Swiss repo market proved to be a stable refinancing source mainly because of sound principles of securitization and efficient risk management practices, which in turn reduce counterparty risks.[3] Overall, the increase shows that the Swiss repo market became an important refinancing source for banks domiciled outside Switzerland.

5 Further Official Funding via the SNB-ECB Swap Facility

Although a large number of banks domiciled outside Switzerland have access to the Swiss repo market, not all of them always have sufficient SNB-eligible collateral, and there are also many that do not have this access at all. The latter banks cannot draw the required Swiss franc funding via the SNB or the interbank market, where SNB-eligible collateral is also market standard. To overcome this problem, in October 2008 the SNB and the ECB jointly announced that they would directly distribute Swiss franc liquidity to their counterparties via an inter-central bank swap facility.

Since all Austrian banks that require funding for their Swiss franc exposure are registered with the ECB, the Austrian banks that had not obtained funds through the Swiss repo market instantly gained access to the primary source of Swiss franc funding, the SNB. Auer and Kraenzlin (2009 and 2011) show that with the introduction of the central bank swap facility, demand for Swiss francs in the euro area jumped to around CHF 40 billion and stayed at this level for about six months. Thereafter, demand for Swiss francs under the EUR/CHF swap facility levelled off and ceased after the termination of the facility in January 2010.

[3] *Collateral delivered in a repo transaction is marked to market twice a day. If under-collateralization occurs, a margin call is automatically triggered by SIX SIS Ltd.*

The precise volume of swap facilities used by Austrian banks is not publicly available, but the OeNB's Financial Stability Report 20 states that "Austrian banks accounted for, on average, 28% of all bids in CHF swap tenders and in July 2009 for even 45%" (see Pann et al., 2010, p. 71).

6 Summary

This paper casts some light on the main funding channels of Swiss franc-denominated loans granted by Austrian banks. While the new issuance of Swiss franc loans has come to a virtual halt since the crisis due to supervisory initiatives and the fact that the major risks of loans denominated in Swiss francs were made visible for borrowers, the loans granted in the past will continue to be a challenge to financial stability in Austria. A major issue in this regard is the refinancing of Swiss franc loans and its risks.

We show that the onset of the financial crisis severely limited the Swiss franc funding opportunities of Austrian banks in the cross-country interbank market and through the issuance of Swiss franc-denominated bonds. However, Austrian banks were able to put the funding of Swiss franc loans on a different footing: First, they established access to the Swiss repo market, under which they could also obtain SNB funding. Second, the joint SNB-ECB swap facility, brought into life in autumn 2008 and terminated at the beginning of 2010, was crucial in securing funding in the most stressed times.

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Contagiousness and Vulnerability in the Austrian Interbank Market

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The purpose of this paper is to analyze (hypothetical) contagious bank defaults, i.e. defaults not caused by the fundamental weakness of a given bank but triggered by failures in the banking system. As failing banks become unable to honor their commitments on the interbank market, they may cause other banks to default, which may in turn push even more banks over the edge in so-called default cascades. In our paper we distinguish between contagiousness (the share of total banking assets represented by those banks that a specific bank brings down by contagion) and vulnerability (the number of banks by which a bank is brought down by cascading failures).

Our analysis consists of three steps: first, we analyze the structure of the Austrian interbank market from end-2008 to end-2011. Second, we run (hypothetical) default simulations based on Eisenberg and Noe (2001) for the same set of banks. Finally, we estimate a panel data model to explain the (hypothetical) defaults generated by these simulations with the underlying structure of the network using network indicators that reflect (i) the network as a whole, (ii) a subnetwork or cluster, and (iii) the node level based on banks' interbank lending relationships. As a result we find strong correlations between a bank's position in the Austrian interbank market and its likelihood of either causing contagion or being affected by contagion.

Although our analysis is based on a dataset constrained to the interbank market of unconsolidated Austrian banks, we believe our findings could be verified by analyzing other banking systems (albeit with a different model calibration). Given the importance of identifying systemically important banks for the formulation of macroprudential policy, we believe that our analysis has the potential to improve our assessment with regard to second-round effects and default cascades in the interbank market.

JEL classification: C23, G21, D85, G01
Keywords: Interbank market, network indicators, contagion, panel analysis

1 Introduction

1.1 Motivation

The financial crisis has revealed the danger of systemic risk due to contagion effects given the interconnectedness of modern banking systems. Identifying systemically important banks has since become one of the key objectives of systemic risk assessment and a necessary precondition for the formulation of macroprudential policy. Systemically important banks can be identified in many different ways. We would like to contribute to this important discussion by applying techniques from network economics.

In general, network analysis requires two input arguments. First, it takes a network, which could either be given or derived through a network formation process. Second, each network analysis needs an objective. In our paper we consider the interbank lending network as given and leave the theory on network formation aside, since the Austrian interbank lending relationships are the

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very network we supervise.[2] We view the interbank lending market as a network where each participating bank is a *node* and each credit a *link*.

The objective of our paper is analyzing one important contagion mechanism within this network, namely counterparty credit risk associated with interbank lending. Ex ante it is unknown whether difficulties at even a relatively small (but interconnected) institution might trigger problems at another bank. In the context of macroprudential analysis such an institution could be considered as a systemically important bank (also known as a key player in network economics). Specifically, we analyze two variants of (hypothetical) contagious default for the Austrian network of interbank lending relationships. First, we study a bank's *contagiousness* in terms of the share of total banking assets represented by other banks that it will cause to default given its own default. Second we study a bank's *vulnerability* in terms of the number of banks by which it is brought down if defaults cascade through the banking sector.

In the remainder of the paper we try to identify key network properties that influence our two variants of contagious default. Our main motivation is finding out whether simulated *contagiousness* and *vulnerability* is driven by (i) banks' idiosyncratic characteristics (i.e. a thin capital buffer) or (ii) network effects/positions, or (iii) by both.

To this end we estimate panel data models that exploit network indicators to predict potential default cascades following individual bank failures while we control for idiosyncratic variables (i.e. the traditional measures of risk-bearing capacity like capitalization ratios etc.). If supervisors are able to identify network indicators that add significantly to the analysis of these models, macroprudential policy will be able to (i) analyze the characteristics/drivers of individual indicators to get a better understanding of default dynamics and (ii) potentially target selected variables to address *contagiousness* and *vulnerability* in the interbank market "indirectly." Our results should therefore provide potential novel means for policymakers to design and/or complement macroprudential tools.

1.2 Related Literature

To the best of our knowledge we are the first to apply panel estimation techniques to interbank liability networks to explain simulated contagious defaults by peer effects for a dynamically developing network over time. The analysis of network effects is not new to other economics fields. Particularly relevant for our paper is the work that followed Furfine's (1999a and 1999b) seminal contribution in which he tried to address the shortage of bilateral exposure data by extracting such information from transaction data. Based on his algorithm, payment system researchers, in particular a community around the Bank of Finland, started to analyze interbank lending exposures.[3] Soramäki et al. (2007), who also applied techniques from the social sciences and physics, were another important inspiration for our work.[4] Recently, there has been a significant interest in directly reported bilateral exposure data as well as

[2] *Moreover, shaping interbank lending relationships in a risk-optimal fashion while capturing all the strategic details is still in its academic infancy. See Cohen-Cole et al. (2010) for a first promising attempt.*

[3] *For an overview of their work see Leinonen (2007 and 2009).*

[4] *They analyze payments transferred between U.S. commercial banks over the Fedwire Funds Service.*

data extracted from payment systems data.[5]

In financial network studies, the closest work from a methodological perspective is Schmitz and Puhr's (2009) investigation of structure and stability for the Austrian large value real-time gross settlement system ARTIS. In this paper the authors also used panel data analysis to test the predictive power of structure for liquidity shortages in the event of (hypothetical) operational outages. With regard to interbank lending, the two closest related articles are on the Austrian and German interbank market. The Austrian interbank lending market has been investigated by Boss et al. (2004), and we draw on a similar dataset as well as from the inspiration of their seminal work. The German interbank market has been analyzed by Upper and Worms (2004). They show that the risk – notwithstanding the shortcoming of all aforementioned papers including our own work that suffers from a rather mechanical integration of the interbank lending channels – is material enough so that the failure of a single bank could lead to the failure of up to 15% of the entire banking system in terms of total assets. Beyond the OeNB's Systemic Risk Monitor (SRM) it seems appropriate to mention the Bank of England's RAMSI[6] that also includes the Eisenberg and Noe (2001) network model.

The remainder of the paper is structured as follows: section 2 covers our data source, section 3 the tools and methodologies employed. In section 4 we present our results before we conclude in section 5.

2 Data[7]

Our main data source is Austria's central credit registry, which covers individual credit risk-sensitive instruments with a volume of more than EUR 350,000 for each Austrian bank on an unconsolidated level on a customer-by-customer basis. Data available from the registry include the outstanding volume of securitized and nonsecuritized loans, guarantees and commitments as well as respective collaterals, specific provisions and the internal rating of the customers' credit quality. Moreover, the data source also covers interbank loans, the focus of our investigation, with the limitation that short-term interbank transactions (with a maturity of less than a month) have been subject to reporting requirements only since 2008. Hence, we are constrained in our analysis to quarterly observations from December 2008 to December 2011.[8] While exposures are reported on a monthly basis, we use additional data sources for the hypothetical default simulations, i.e. the capital positions of each bank at each point in time, which are available on a quarterly basis only. Finally, it is important to point out that our panel data set is balanced.[9]

3 Methodology

The following section is divided into three subsections. First, we explain our use of network indicators with a particular focus on their usability for financial systems/lending relationships amongst banks. Second, we describe briefly the tools/methodology employed to run hypothetical default simulations.

[5] *See for example Cont et al. (2010) or Jaramillo et al. (2012).*

[6] *For a description of RAMSI refer to Alessandri et al. (2009).*

[7] *For a detailed description of the data see Boss et al. (2006a).*

[8] *Given the reporting threshold of EUR 350,000, we are confident to cover the entire interbank market.*

[9] *No default simulation results are available for Q2 2010, instead of 13 we have to contend with 12 observations.*

Third and finally, we describe the panel data regression techniques used to analyze the potential predictive power of structural patterns (i.e. network indicators) for stability (i.e. simulated contagious defaults).

3.1 Network Indicators[10]

We calculated approximately 100 different candidate network indicators for analysis. However, in the following section we describe a noteworthy subsample which at a later stage is either (i) used to describe the Austrian interbank market as a network (see section 4.1) or (ii) used to explain contagion via structural indicators (4.3).

Degree

The *degree* k_h of node *h* is measured by the number of *links* originating *(outdegree)* or terminating *(indegree)* at *node h*. *In-* and *outdegree* will match each other in an undirected network. For the interbank liability network, these *links* reflect the number of loans granted *(outdegree)* or received *(indegree)*. A high degree therefore indicates that an institution is very active in the interbank market. Traditional network analysis – within and outside the scope of financial systems – has often focused on degree distribution, because many real-life networks show properties far from what could be expected from random networks.[11]

Density

The connectivity of *node h* is its *degree* over the number of *nodes n*. On a network level, *average connectivity,* or *density,* is defined by the number of actual (directed) *links m* over the number of possible (directed) *links n(n–1).* For the interbank liability network, a high *density* therefore reflects a very active interbank market with many lending relationships amongst participants.

Betweenness centrality

The *betweenness centrality* $C_B(h)$ of *node h* provides a measure of how many *shortest paths* d_{ij} pass through node *h*. Let $s_{ij}^{(h)}$ be the number of *shortest paths* between all pairs of *nodes i,j* that pass through the *node h*, and let s_{ij} be the number of all *shortest paths* between all pairs of *nodes i,j* then:

$$C_B(h) = \sum_{h \neq i \neq j} \frac{s_{ij(h)}}{s_{ij}}$$

In the context of the interbank liability network, *betweenness centrality* provides a measure of centrality in the sense that many of the shortest paths contain only central *nodes*. As the likelihood of centrality increases with the number of interbank relations, we expect larger, more important – in a systemic sense – institutions to rank high. This should be particularly true for a tiered banking system, where often the only "entry point" of the shortest paths to a cluster runs through the apex institution of that very cluster (comparable to a traditional hub-and-spoke structure).

Katz (status) centrality[12]

For our purposes the Katz centrality of a bank describes how important a bank is by relating it to the importance of other banks from which it borrows. The method is self-referential and also takes into account different *link*

[10] *Where possible we follow the notation of Albert and Barabási (2002).*

[11] *See for example Dorogovtsev et al. (2000) and Albert and Barabási (2002).*

[12] *See Katz (1953).*

strength (i.e. loan size). It is formally defined as

$$C_{Katz}(i) = \sum_{k=1}^{\infty} \sum_{j=1}^{\infty} \alpha^k (A^k)_{ji}$$

where A stands for the adjacency matrix and α[13] for attenuation factor. Of all centrality measures it is our preferred indicator in an interbank network context (see section 4.3.1 for a detailed discussion).

Clustering coefficient

The *clustering coefficient* $C_c(h)$ of an individual *node* h with k_h neighbors measures how well the latter are connected among each other.[14] The number of potential *links* between the k_h neighbors is $k_h(k_h - 1)/2$. Let the actual number of nodes between them be E_h so that:

$$C_C = \frac{E_h}{k_h(k_h - 1)/2}.$$

For the interbank liability network, the *clustering coefficient* provides a measure of connectedness of the neighboring banks; i.e. neighboring banks that share mutual relations are more likely to share the burden of a potential default and are at the same time more likely to suffer from contagion.

Clustering

Clustering – as opposed to the *clustering coefficient* – is not a network indicator but used to identify community structures within a given network with the aim to find members that "belong together." This can be achieved by various methods. The one employed in this paper builds on optimizing *modularity,* where, for a given division of the network's *nodes, modularity* reflects a high concentration of *links* between a cluster's *nodes* compared to a random distribution of *links* between all *nodes* regardless of clusters.[15] With regard to interbank liability matrices in general, and those of tiered banking systems in particular, cluster analysis aims to address/analyze the historically established structure of a banking system.

K-cores

K-cores are another means of identifying community structures within a given network, in this case communities of "importance." A *k-core* is a subnetwork of a given network where each *node* has at least a value of *k* in the respective property under investigation (usually a *degree* of *k*).[16] In the context of interbank networks, this allows to sample the core of the network, i.e. the highly connected institutions according to a defined threshold.[17]

3.2 Default Simulations

The following section explains the tools/methodology employed to run a hypothetical default algorithm to simulate hypothetical contagion effects within the Austrian banking system. To generate the underlying data, we used the OeNB's Systemic Risk Monitor (SRM).[18] One of the key assets of the SRM is that it links, amongst

[13] *This factor has been set to 1/(1+min(max(indegree, outdegree)) to ensure convergence of the infinite series.*

[14] *See Watts and Strogatz (1998).*

[15] *See Newman et al. (2006).*

[16] *See Seidman (1983) and Batagelj and Zaveršnik (2002).*

[17] *An illustrative example is included in chapter 4.3.1.*

[18] *See Boss et al. (2006a and 2006b).*

others, Austria's central credit registry data (described in section 2) with more traditional supervisory reporting data (e.g. capital positions), thus providing an integrated view of various data sources and different risk categories. The SRM model also includes an assessment of contagion risk through the interbank market.

In greater detail, the data generated by the SRM comprise a set of $N = \{1,...,n\}$ banks. Each bank is characterized by an exogenously given value of equity e_i net of interbank positions, and the network is represented as an $n \times n$ nominal liability matrix L, where L_{ij} stands for the liability of bank i to bank j.[19] Each interbank lending network is thus a pair (L,e).[20] The SRM also runs Elsinger et al.'s (2006) implementation of the Eisenberg Noe (2001) hypothetical network clearing algorithm and the hypothetical default simulations for each bank at each quarter. Using this algorithm we construct the dependent variables of our analysis.

First, we look at *contagiousness,* calculating for each time period t and for each bank i in our sample the number of banks that are brought down by a *fundamental default* of bank i. Second, the *vulnerability* of bank i reflects the number of banks (relative to its *outdegree*)[21] whose *fundamental default* induces bank i to default as well. In our context a *fundamental default* means that a bank cannot repay any of its obligations.[22] Except for the initial exogenous default, all other induced defaults need not be fundamental. We assume an *induced default,* i.e. one that occurs due to contagion, if the *capital adequacy ratio* (CAR) falls below 2%.

The hypothetical default algorithm has the following structure. For each period t and each bank i we assume a *fundamental default* to happen, subject to the assumption that all other payments are served. If no other bank defaults in turn, then the algorithm is terminated. However, if another bank defaults as well then the algorithm proceeds, subject to the adjusted assumption that all liabilities are served proportionally.[23] Subsequently, the algorithm either stops if no new defaults occur or triggers a new clearing round if further defaults cause other banks to fail to meet some of their liabilities. The algorithm stops after n rounds at the most. Thus, the resulting *contagiousness* of bank i at period t reflects the number of sequential defaults of the clearing algorithm, whereas the *vulnerability* of bank i is the result of all n-clearing algorithm sequences for each bank j for period t; i.e. it simply counts the number of sequential defaults of bank i.

[19] *For economic and technical reasons we assume that* $L_{jj} \geq 0$ *and* $L_{ii} = 0$. *This means that nominal liabilities are defined to be positive without loss of generality and that a bank cannot lend to itself. Intragroup transactions are not excluded since we look at unconsolidated Austrian banks.*

[20] *The conceptual framework of the interbank market network model is based on Elsinger et al. (2006). It is an extended version of the network model of Eisenberg and Noe (2001). We refer to these papers for a more detailed description of a financial network.*

[21] *A bank can be vulnerable to the default of more banks than its outdegree, i.e. immediate neighbors, so this procedure can be understood as a proportional normalization.*

[22] *In general different degrees of exogenous defaults could be analyzed. A fundamental default is the most extreme but straightforward assumption as any kind of proportional repayment of liabilities would create room for additional interpretation.*

[23] *It is possible to include levels of seniority into the liability structure as well.*

3.3 Panel Data Regressions

In this section we outline the econometric theory and estimation procedure behind the models to explain *contagiousness and vulnerability*. Considering the structure of the data (banks, time periods) we choose a panel model approach to link the dependent variables to independent (network and balance sheet) indicators. For both dependent variables we follow a standard test procedure to select the statistically best model. We consider the following model:[24]

$$y_{i,t} = \alpha_i + x^T_{i,t}\beta + u_{i,t}$$

where y represents the endogenous variables and x the exogenous variables. We assume the same slope coefficients of the independent variables ($\beta_i = \beta$) as we do not observe enough time periods to produce efficiently estimated coefficients. Following the standard literature on static panel econometrics we are left with two options concerning α_i: fixed effects or random effects. In contrast to a fixed effects model the random effects model implies $E[\alpha_i x_{i,t}] = 0$. So there is no correlation between the individual specific effect and all other independent variables. A Hausman test is used for each panel model in section 4.3 to find the most appropriate model.[25]

4 Results[26]

4.1 Structure: The Austrian Interbank Market as a Network

A lot has been written about interbank lending relationships. To the best of our knowledge, however, all authors who have come before us[27] have disregarded stable structural features in their attempt to describe the banking system with network indicators. We will proceed likewise in subsection 4.1.1, but aim to add to this analysis in subsection 4.1.2 by discussing empirically identified clusters in our dataset and relating them to the historically established structure of the Austrian banking system.

4.1.1 Network Properties

In this subsection we use our balanced panel of 749 banks, for which we have quarterly observations from end-2008 to end-2011.[28] We will discuss averages and distributions of the network indicators presented in section 2.1.

Based on one of the most prominent network indicators, *degree,* we can already establish one of the main features of the Austrian interbank network that has its origin in the historically grown Austrian banking system: a few important central *nodes* and many smaller banks; i.e. the tiered structure of the Austrian banking system, due to the importance of the savings and cooperative banking sectors,[29] is reflected in

[24] *Given a set of independent variables we test whether the data can be pooled. Usually the poolability hypothesis is strongly rejected as panel data allow to control for time-invariant variables that cannot be observed or measured. In the context of finance these could be time invariant bank-specific characteristics such as the underlying business model.*

[25] *In the presence of heteroskedasticity we use robust standard errors in the various panel estimations. Therefore we need to use a more general Hausman-type test to choose between fixed and random effect models. See Arellano (1993) for more details and Schaffer and Stillman (2006) for a STATA software implementation.*

[26] *Networks in this chapter were visualized using Pajek and Visone.*

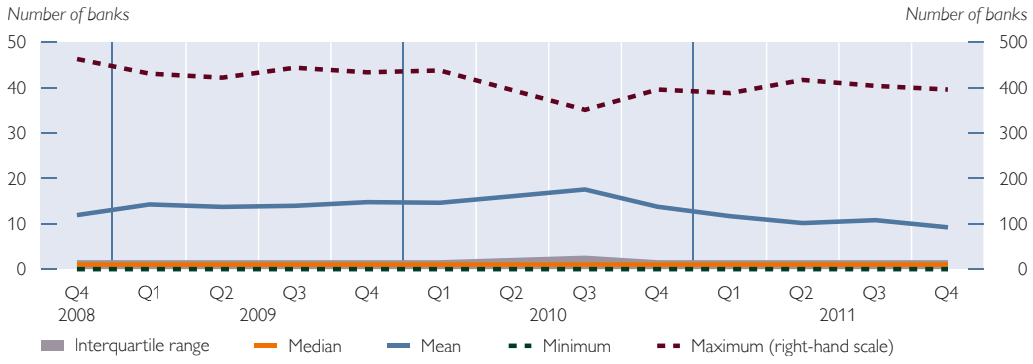
[27] *From Boss et al. and Upper and Worms (both 2004) to Cont et al. (2010) and Jaramillio et al. (2012).*

[28] *With the exception of Q2 2010, where no data are available.*

[29] *In Austria we have got one savings bank sector ("Sparkassen") and two cooperative banking sectors ("Raiffeisen" and "Volksbanken").*

Chart 1

Interquartile Ranges: Outdegree

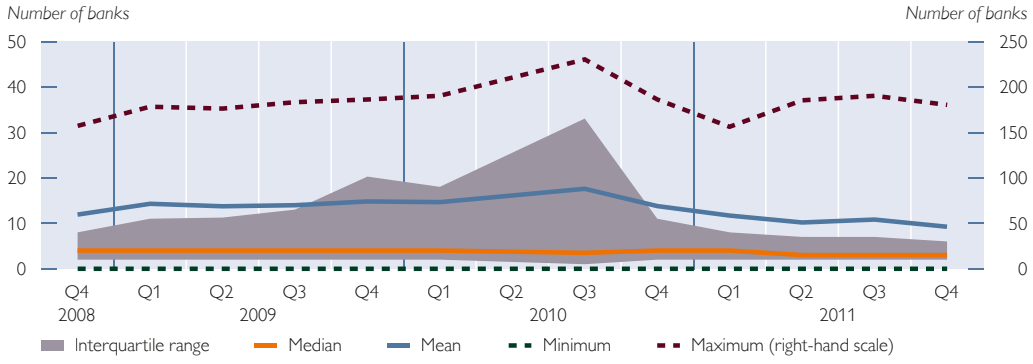


Source: OeNB calculations.

Note: The results are based on a sample of 749 Austrian banks from end-2008 to end-2011 (with the exception of Q2 2010 for which no data were available).

Chart 2

Interquartile Ranges: Indegree



Source: OeNB calculations.

Note: The results are based on a sample of 749 Austrian banks from end-2008 to end-2011 (with the exception of Q2 2010 for which no data were available).

the distribution of *outdegrees* (see chart 1) and *indegrees* (see chart 2).[30]

Both charts show the mean and interquartile ranges, with the mean most of the time above the 3rd quartile.[31] Interestingly enough, the "lender"-indicator *outdegree* is significantly more concentrated than the "borrower"-indicator *indegree*. Moreover, although the maximum in both cases is off the scale, it is on average above 400 for the former and less than 200 for the latter.[32] Finally, a look at the development over time reveals that the mean *degree* (both *out-* and *indegree*) as well as the two middle quartiles de-

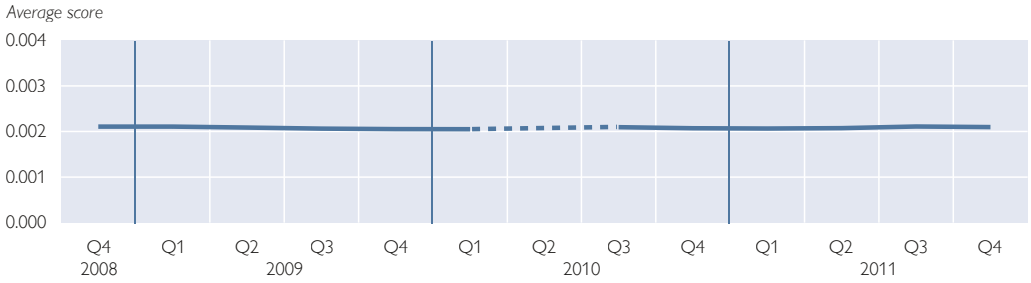
[30] *Although not unrelated, it is not only about the size of these institutions.*

[31] *The mean out- and indegree is by definition the same for each point in time. By design, important structural information is hidden.*

[32] *The minimum for both, at each point in time, is 0. Not necessarily by definition, but also not unexpected, given the number and size of banks in our sample.*

Chart 3

Average Betweenness Centrality

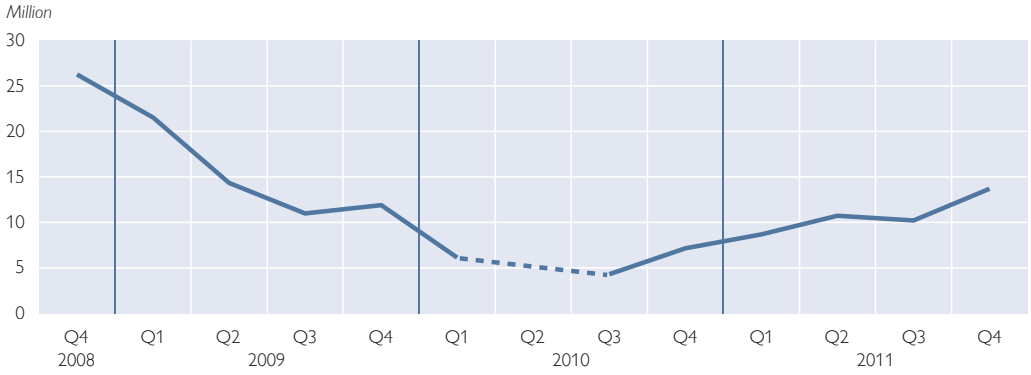


Source: OeNB calculations.

Note: The results are based on a sample of 749 Austrian banks from end-2008 to end-2011 (with the exception of Q2 2010 for which no data were available).

Chart 4

Variance of Katz Centrality[1]



Source: OeNB calculations.

[1] The absolute level of the variance is in millions but has no real significance.

crease from end-2008 to end-2011. This reveals a reduction in interbank connections of our sample, or – put in different terms – reduced density of the network.

The average *betweenness centrality* remains almost completely stable over time (see chart 3). This might be associated with stable structural properties of the Austrian banking systems that can be observed independently of the network *density*, which has fluctuated between end-2008 and end-2011. However, looking at the variance of the weighted *Katz centrality* (see chart 4), which can be interpreted as a weighted network concentration measure (note the inverse trend compared to mean *in-* or *outdegree*), we conclude that the network, after having taken a path towards greater diversification, is now exhibiting a trend towards greater concentration.

4.1.2 Cluster Analysis

As quantified by Boss et al. (2004) the Austrian banking system is heavily tiered and clustered. The *Raiffeisen* sector comes with a three-tier structure (with intermediate institutions in Austria's federal states), whereas *Sparkassen* and *Volksbanken* are organized in

a two-tiered system. Applying Pajek's[33] version of the Louvain algorithm[34] we identify 13 communities consistent with "expected" sectoral boundaries. Charts 5 and 6 show the evolution of these 13 clusters from end-2008 to end-2011 respectively.[35]

The clustered loan networks (see charts above) confirm what we have observed in the previous section. The decrease of inter-cluster connectivity has contributed substantially to the loss in overall *density* of the network from 1.6% (end-2008) to 1.2% (end-2011), after a peak of 2.3% in Q3 2010.[36]

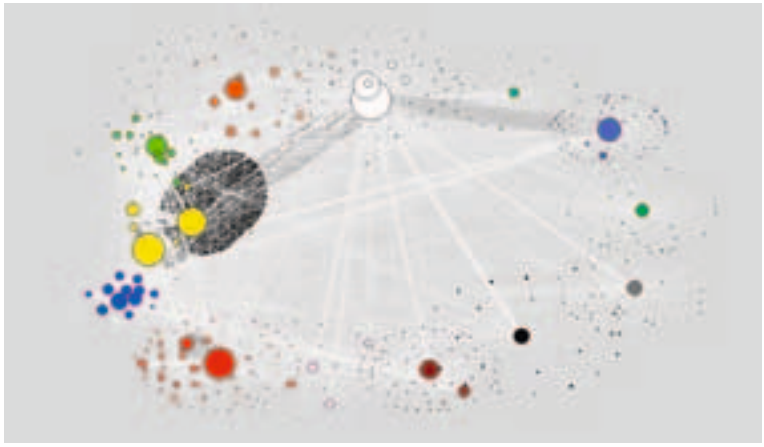
Putting all observations from section 4.1 together, we find that (i) the interbank lending network's *density* decreases over time (particularly since Q3 2010), while (ii) the central *nodes* become more important (as measured by *Katz centrality* variance). Moreover, we are able to characterize (iii) a fairly stable network structure that reflects the historical development of the Austrian banking system.

4.2 Stability: Contagious Defaults in Hypothetical Simulations

Whereas the (theoretical) literature about default cascades is even more abundant than the literature about financial systems as networks,[37] the published empirical evidence is limited. Hence we will not contribute to the former but try to add some to the latter. At the same time, the results of the hypothetical default simulations, while not the primary objective of our

Chart 5

Clustered Loan Network as at End-2008

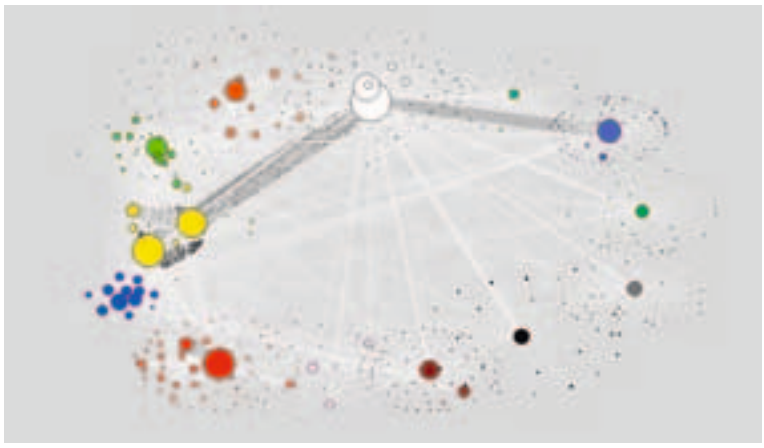


Source: OeNB calculations.

Note: Darker lines indicate a higher loan volume; the black bubble within the yellow cluster represents a very large in-cluster loan.

Chart 6

Clustered Loan Network as at End-2011



Source: OeNB calculations.

Note: Darker lines indicate a higher loan volume; the black bubble within the yellow cluster represents a very large in-cluster loan.

[33] *See http://vlado.fmf.uni-lj.si/pub/networks/pajek for details.*

[34] *See Blondel et al. (2008). The algorithm optimizes modularity for a given resolution parameter, which is associated with a high proportion of links within a cluster – more than can be expected randomly.*

[35] *We are interested in "useful separation" rather than in discovering some "true" community structure.*

[36] *See also chart 1 (degree), as density is a linear transformation of the average degree.*

[37] *Before Eisenberg and Noe (2001) came Rochet and Tirole (1996), who focused on central bank policy options in a model of interbank lending, and Allen and Gale (2000), who studied how the banking system responds to contagion when banks are connected under different network structures.*

paper, are covered in the following section. We want to characterize some of the major observations related to *contagiousness* as well as *vulnerability* in our sample as those are important for the estimation of our panel models.

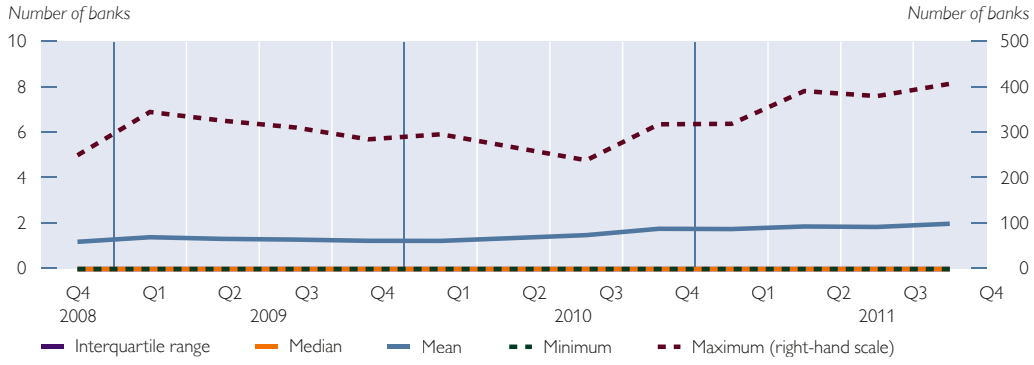
4.2.1 Default Indicators

As described in the methodology section (see 3.2) we explicitly target contagious defaults, i.e. those that are not caused by a fundamental weakness of a bank but those that follow the failure of another bank in the banking system. We simulate the default cascades of banks no longer honoring their commitments on the interbank market following Elsinger et al. (2006) and distinguish between *contagiousness* (the number of other banks that a bank brings down by contagion) and *vulnerability* (the number of banks by which a bank is brought down).

To describe their basic properties, we stick closely to the observations we made regarding the *degree* (see the beginning of subsection 4.1.1). On the one hand, the default indicators mirror

Chart 7

Contagiousness

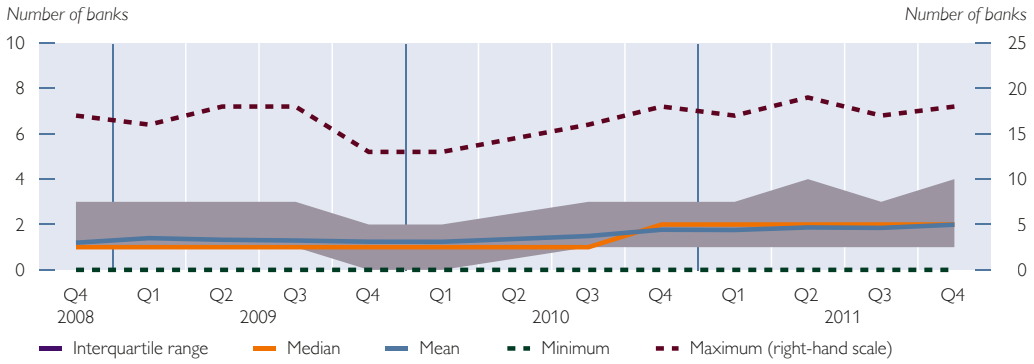


Source: OeNB calculations.

Note: The results are based on a sample of 749 Austrian banks from end-2008 to end-2011 (with the exception of Q2 2010 for which no data were available).

Chart 8

Vulnerability



Source: OeNB calculations.

Note: The results are based on a sample of 749 Austrian banks from end-2008 to end-2011 (with the exception of Q2 2010 for which no data were available).

the *degree* insofar as a few important/central *nodes* overshadow the many smaller banks. This is particularly true for *contagiousness* (see chart 7), where even the third quartile remains zero throughout the observation period. This pattern is less pronounced for *vulnerability* (see chart 8), which makes perfect sense insofar as by definition a bank with many creditors will not be as dependent on any single one of them, leading to a "natural boundary."

At the same time, a look at the development over time reveals that both default indicators increase from end-2008 to end-2011. This finding is particularly important, as it reveals an increase in *contagiousness* despite a reduction in the *density* of the Austrian interbank lending network. Defaults, to a certain degree, appear to have far more in common with the focal points of the network.

Given this observation, are central *nodes* central *nodes?* That is to say, is there a link between frequent defaulters irrespective of whether we look at the ones that cause high *contagiousness* or the ones affected by high *vulnerability*. Looking at the data we can see that while no bank's default is caused by more than 20 different institutions, some banks' fundamental default causes significant damage to the entire banking system. We note that despite the superficial similarity in the development of *defaults* and *weights,* there is no such similarity in depth. This observation will become important for our panel model in section 4.3, as it indicates that entirely different models are necessary to explain one or the other.

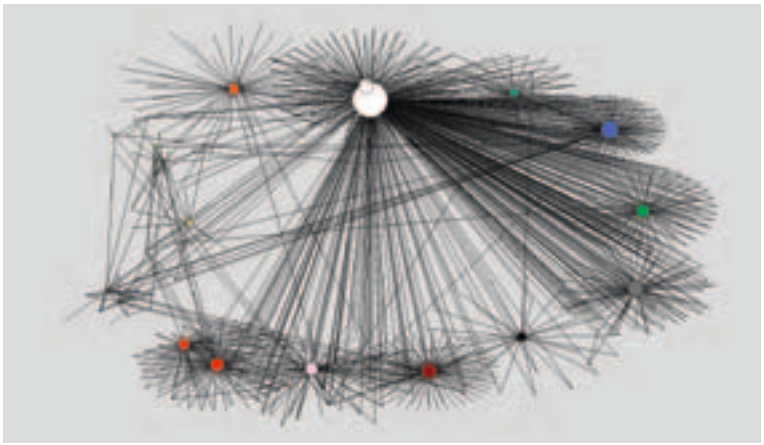
4.2.2 Default Networks

In analogy to section 4.1, where we interpret the interbank lending market as a network, we can do the same for the output of our hypothetical default simulations. Same as for the interbank liability matrix L, the default matrix D carries zeros in the diagonal, is of dimension $n \times n$, binary and not symmetric.

At end-2011 we compute an *average degree* of 3.2 and a *density* of 0.21%, while at end-2008 the corresponding network yielded 2.2 and 0.15% respectively. This is simply a restatement of the "increasing number of defaults" observation made above. In network terms one could say that the development is showing an inverse path compared to the loans-based network, resulting in a denser, more contagion-prone environment. However, with loan network *density* peaking in Q3 2010 when default network density was "only" at 0.19%, it appears that this trend has more to do with the more pronounced tiered structure than with mere overall *density*.

Chart 9

Contagiousness Network as at End-2011



Source: OeNB calculations.

Note: The results are based on the sample of 749 unconsolidated Austrian banks at end-2011 and end-2008, respectively. The node size represents the number of banks that the bank causes to default by contagion. The positions of the banks are the same as in charts 7 and 8.

4.3 Can Structure Explain Stability?

Having discussed the properties of our left-hand side variables, the next step is to find the properties of the banks/

banking system that can explain them. We first estimate a model for *contagiousness,* see section 4.3.1, then *vulnerability,* see section 4.3.2. As right-hand side variables we test for any combination of bank-specific indicators (from the OeNB's supervisory reporting system) and numerous network indicators that are calculated on (i) the network as a whole, (ii) a subnetwork or cluster, and (iii) the *node* level based on banks' interbank lending relationships.[38] We will only present one model for each default indicator. However, we will discuss how we arrived at those models, always keeping economic intuition as well as explanatory power firmly in sight.

4.3.1 Explaining Contagiousness

Understanding the determinants of *contagiousness* is one of the most challenging questions in modeling an interbank network. A systemically important bank could be defined as a bank that adversely affects a number of other banks in case it runs into trouble itself. In our regression we explained the impaired share of total banking assets since the mere number of caused defaults would obscure the actual cost (of a hypothetical bail-out) given the vast difference in size across our banks.

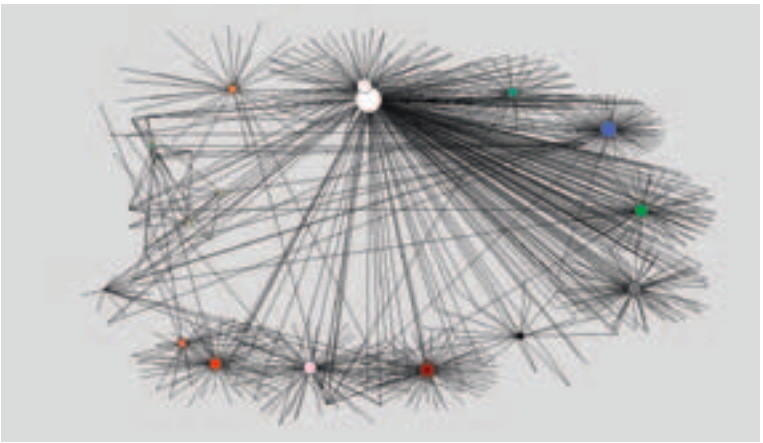
As a starting point, given the iterative nature of default dynamics, self-referential indicators appear as somewhat stronger candidates. *Eigenvector centrality* appears to be an obvious candidate and even yields acceptable regression statistics, but misses the point of the Austrian (tiered) loan network, since it is driven by cyclic areas in networks, and does not address the hub-and-spoke structure we observe as well.[39]

Betweenness centrality and *closeness centrality* have shortcomings as they are based on *shortest* paths, which carry no obvious interpretation in loan networks and indeed show little explanatory power for *contagiousness*. Our preferred network indicator is thus a modified version *of Katz centrality*. It takes into account that *nodes* without incoming *links* have no power to cause contagion (their *centrality* must be zero); banks with only incoming *links* have the power to cause contagion (their *centrality* must not be zero); the neighbors' neighbors matter as well as the loan sizes.

From the *centrality* layout chart (see chart 11), which shows banks with higher *Katz centrality* closer to the center, we can see that all banks with a high degree of contagiousness (illus-

Chart 10

Contagiousness Network as at End-2008



Source: OeNB calculations.

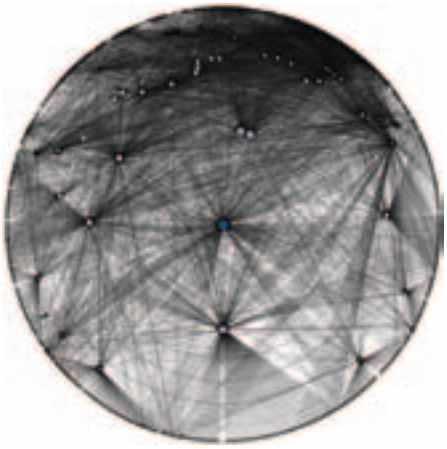
Note: The results are based on the sample of 749 unconsolidated Austrian banks at end-2011 and end-2008, respectively. The node size represents the number of banks that the bank causes to default by contagion. The positions of the banks are the same as in charts 7 and 8.

[38] *The latter were described in detail in section 3.1 and their respective realizations for the Austrian interbank lending network from end-2008 to end-2011 discussed in section 4.1.*

[39] *For a detailed discussion of Eigenvector centrality and related measures see Newman (2010), Bonacich and Lloyd (2001) and the forthcoming, extended version of this paper.*

Chart 11

(Katz) Centrality Layout



Source: OeNB calculations.

Note: Larger and darker circles represent higher contagion effects; the closer to the center the higher the Katz centrality.

Table 1

Panel Data Regression Statistics: Contagiousness

Fixed effects (within) regression

	b	se	t	p
WeightedKatz	1.63e-06	5.18e-07	3.15	0.002
_cons	.0010053	.0002355	4.27	0.000
sigma_u	.00833046			
sigma_e	.00350343			
rho	.84971309 (fraction of variance due to u_i)			
r2 within	0.296			
r2 between	0.712			
r2 overall	0.662			
N-observations	8976			
N-groups	749			

Source: OeNB calculations.

trated by darker color and larger area) are far away from the outskirts of the circle. On the other hand we find no small, light *nodes* near the center. So, banks which are granted many and/or large loans carry higher *Katz centrality* and tend to cause the most damage when defaulting.

In addition, we have tested for idiosyncratic characteristics of *nodes* by adding various asset- and capital-based indicators from the OeNB's supervisory reporting data. To our surprise, neither were those indicators adding to the explanatory power of our model, nor were they statistically significant.[40] This yields a simple model with *Katz centrality* as the only explanatory variable as our preferred model (see table 1), thereby demonstrating that network indicators do indeed add information to explain contagiousness unavailable in standard supervisory reporting data.

4.3.2 Explaining Vulnerability

Our second dependent variable, *vulnerability,* measures the vulnerability of a bank with respect to fundamental defaults at other banks. Thus, we explain how many times out of 748 simulations where one bank defaults at a time, the given (749th) bank defaults through contagion. To control for the difference between *fundamental* and *induced defaults* we add a *leverage ratio (capitalbyassets)* to the panel model.[41] However, it is not significant at the 10% level (see table 2). Again, the network properties seem to be more important in terms of explanatory power for *vulnerability* than traditional measures of risk-bearing capacity.

Since we hypothesize that *vulnerability* should be more dependent on network properties we select *outputdegree k-core (outputdegreekcore), cluster-density (clusterdensity),* the *number of banks in cluster (numbanksclu)* and the *clustering coefficient (clusteringcoeff~sone)* in our model.

In more detail, the rationale behind the selection is the following: The higher the order of *outputdegree k-core* of a bank, the more likely are alterna-

[40] *Again, we refer to the forthcoming extended version of the paper for a detailed discussion.*

[41] *The capital-to-assets ratio is based on the OeNB's supervisory reporting and defined as capital over assets.*

tive sources of funding and the less pronounced is the effect of a core member's default. This variable has by far the most predictive power even though no weighting was performed (i.e. cores are independent of loan sizes).

The coefficient of *cluster density* is also negative, which means that a higher degree of connectedness within one of the 13 previously identified clusters reduces *vulnerability*. Again, the bigger the number of banks in a cluster the lower their *vulnerability* since the portfolio diversification effect of interbank connections within a cluster reduces the likelihood of being contagiously affected by another bank.

Finally, the *clustering coefficient* measures the connectedness of one *node's* neighbors. As the *clustering coefficient* is on average one quarter of the average *cluster density* the *clustering coefficient* is an economically more important indicator for *vulnerability*.

The large number of variables (in comparison to the *contagiousness* model) can be attributed to the fact that our research suggests an even greater importance of the immediate vicinity of a *node* in explaining its *vulnerability*. Only the introduction of cluster variables yielded any statistically significant models with regard to explanatory power. This constitutes the most important finding of our paper, and adds value in particular with regard to Schmitz and Puhr (2009), where the authors faced similar difficulties accounting for *vulnerability* (albeit in the payment system world).

Table 2

Panel Regression Statistics: Vulnerability

Fixed effects (within) regression

	b	se	t	p
outdegreekcore	−0.018***	0.002	−8.113	0.000
clusterdensity	−0.294*	0.132	−2.229	0.026
capitalbyassets	−0.396	0.281	−1.410	0.159
numbanksclu	−0.001***	0.000	−4.265	0.000
clusteringcoeff~sone	−4.736***	0.937	−5.054	0.000
_cons	−0.825***	0.037	22.122	0.000
r2 within	0.114			
r2 between	0.411			
r2 overall	0.306			
N-observations	8976			
N-groups	749			

Source: OeNB calculations.

Note: p<0.05; ** p<0.01; *** p<0.001.*

5 Conclusion

By applying standard network techniques to our dataset of interbank lending relationships for the Austrian interbank market from end-2008 to end-2011, we were able to find ties between a bank's position in the lending network and its performance in hypothetical default simulations (conducted as part of OeNB's quarterly systemic risk assessment). To quantify these ties we used a panel model approach to link the defaults (dependent variables) to network and/or balance sheet indicators (independent variables).

With regard to a bank's *contagiousness* (measured in terms of the assets of any other banks that it would drag down if it were to default), the iterative nature of *Katz centrality* allows for a very good prediction of default cascades and also makes it possible to assess potential recapitalization requirements for the banking system, thus providing an alternative measure of systemic importance. The model does not take into account the distribution of a bank's neighbors' risk-bearing capacity or the proportion of loans to the bank's capital. These points together with further work to calibrate *Katz centrality*[42] provide possible paths for further development of the model.

[42] *In particular the search for an optimal attenuation factor* α.

For an assessment of the *vulnerability* of a bank (measured in terms of the number of defaulted banks that would cause a given bank to go down by contagion), we are able to show that adding more information about the structure of the banking system[43] by introducing cluster-network indicators improves the estimation of our panel model significantly. A possible route for refinement would be the introduction of a different configuration, possibly adding weights to account for loan size, of the *clustering* algorithm as well as looking at introducing a ratio for individual loans to capital. This should enable us to improve our measure of a given bank's *vulnerability* in terms of proneness to default by contagion.

Nevertheless, already at this stage we believe that our models provide a complementary look at a bank's risk profile for (macroprudential) supervisory purposes. Although we used a dataset constrained to unconsolidated banks from a single country, we are optimistic that our findings could be verified for other banking systems.[44] Finally, further refining our research (e.g. through a specific analysis of contagion channels), we can envisage recommendations for policymakers based on our work with regard to an adequate policy mix/communication strategy to possibly mitigate the risks associated with second-round effects, contagion risk and default cascades in the interbank market.

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[43] *The "known structure" in case of the Austrian banking system is its historically established banking sectors and their tiered structure.*

[44] *In particular it would be interesting to examine how the significance of network indicators is different in different banking networks and different capital level environments.*

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Clustering Austrian Banks' Business Models and Peer Groups in the European Banking Sector

Robert Ferstl, David Seres[1]

As the European banking sector is becoming increasingly intertwined, the degree of interdependence is also rising. Consequently, it is key to conduct comparisons for a timely identification of emerging patterns of this development. Furthermore, the product range of banks has expanded so that heterogeneity across the banking sector has also been growing rapidly. This rising heterogeneity makes it increasingly impractical to carry out comparisons on an aggregate level. A more efficient approach is identifying one or more "common denominators" of similar banks and establishing groups of banks which share this (these) common denominator(s). In this paper, we consider the business models of banks as one such common denominator, which can be described by a set of variables. These variables span a high-dimensional space where each bank represents a point, which can be measured by a statistical distance. Points close to each other may constitute a group, while points distant from these points will not belong to that group. Therefore, the objective of this study is, on the one hand, to define an efficient set of variables correctly reflecting the business models of banks and, on the other hand, to find subsets of high similarity. By applying statistical clustering techniques we aim to understand banks' business models, thereby gaining new insights into the design of the European banking sector and, in particular, identifying peer groups relevant to the top Austrian banks. Assessing the distribution of risk and identifying certain business patterns within those groups allows a meaningful ranking of Austrian banks in comparison to their European competitors.[2] The analysis in this paper is conducted on the basis of a purely quantitative methodology and the results should be interpreted accordingly.

JEL classification: C02, C44, C58
Keywords: Austrian banks, cluster analysis, data-driven decision support

The European banking sector is currently undergoing rapid changes due to recent financial market developments and the introduction of new legislation, such as the Capital Requirements Regulation/Capital Requirements Directive IV. This study aims to identify emerging patterns of these changes in the European banking sector via clustering analysis. There is a broad stream of literature analyzing the efficiency of banks. Tortosa-Ausina (2002), for instance, focuses on cost efficiency and calculates product mix clusters. Several authors analyze the influence of the recent financial crisis on banks' business models. Altunbas et al. (2011) focus on bank risk and use probit and linear regressions. Ayadi et al. (2011) perform a screening analysis of business models in European banking using clustering methods. Their sample consists of 26 European banks, and they use end-of-year data. Ayadi et al. (2012) extend their previous paper by using a larger sample and focusing on the impact of new regulatory measures.

This study builds on the existing literature and is based on a very large sample of European banks. We provide a detailed motivation for the selection of variables and validate the robustness of the statistical methodology used. The paper is structured as follows: Section 1 describes the statistical methodology used for identifying banks' busi-

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[2] *The data were acquired via Bankscope and are publicly available from banks' financial statements.*

ness models, section 2 discusses the database and the definition of variables, section 3 gives the results for the five identified business models and for a peer group of the top 3 Austrian banks, and section 4 provides a summary.

1 Methodology

This section deals with the mathematical and statistical background of our analysis and explains the clustering algorithm used to determine the different business models and the methodology to identify the peer groups of certain banks. Cluster analysis is a statistical tool for detecting groups that is especially helpful when the data exhibit no visible natural clusters. It is important to note that clustering is as much an art as it is a mathematical methodology. There exist numerous algorithms for clustering, ranging from classical hierarchical ones to highly sophisticated algorithms. There is no globally optimal strategy for choosing the correct methodology. Ideally, it should be in line with the underlying data and with the expectations of the results. For example, with data of small dimensions (i.e. with only a handful of observations and variables), hierarchical methods have provided reasonable solutions in some cases, whereas with data of large dimensions drawn from a high-dimensional space, the application of partitioning clustering algorithms is advisable. These considerations make the process of choosing a clustering method a trial-and-error procedure, in which the results of many algorithms have to be checked for consistency with the economic expectations from expert judgement. For a detailed summary of widely used clustering algorithms see Everitt et al. (2011).

In this paper we use a partitioning clustering algorithm, namely *k*-centroids clustering developed by Leisch (2006). It was chosen for several reasons:

- Simplicity: It employs the popular *k*-means algorithm for determining the clusters, which is a straightforward optimization technique.
- Robustness: It provides generally similar outputs for different random seeds.
- Speed: The algorithm is fast, which is particularly useful when bootstrapping is necessary.
- Results: It delivers the most plausible clustering results compared to other techniques.

1.1 *k*-Centroids Clustering

Given n column vectors of observations $X = \{x_1,...,x_n\}$ from a set of m random variables $\mathbf{X}$ spanning a space χ, the aim is to find a partition set $\mathbf{P}$ of high similarity within the set X. Dissimilarity usually is quantified by a function $d : X \times X \rightarrow \mathbb{R}^+$ fulfilling the following properties:

$$d(x, y) \geq 0,$$
$$d(x, y) = 0, \text{ iff } x = y,$$
$$d(x, y) = d(y, x)$$

The function d is then called a metric dissimilarity or distance. A partition set $\mathbf{P} = \{P_1,...,P_k\}$ of k disjoint clusters is formed by setting k centroids

$$C_k = \{c_1,...,c_k\}, c_k \in \chi$$

and assigning each point $x_i \in X$ to the cluster P_j with the closest centroid $c(x_i) = c_j$, i.e.

$$x_i \in P_j \text{ if } \min [d(x_i, C_k)] = d(x_i, c_j) \quad (1)$$

We aim to find a good set of centroids C_k which minimizes the entropy in each cluster of the partition induced by C_k. The optimization problem is then as follows:

$$\min_{C_k} d(X, C_k) = \sum_{x_i \in X} d\,(x_i, c(x_i))$$

To be able to compute the objective function, an appropriate distance measure d has to be defined. In this paper we focus on the Mahalanobis (1936) metric since it accounts for different variances as well as for the covariance structure within X. The metric is defined as

$$d_M\,(x_i, c(x_i)) = \sqrt{\left(x_i - c(x_i)\right)^T \sum_X^{-1} (x_i - c(x_i))}$$

with Σ_X as the covariance matrix of X. A rather desirable side effect of this metric is that due to the term Σ_x^{-1}, it becomes scale-invariant and hence there is no need to normalize the variables beforehand. It is easy to see if Σ_x^{-1} is a diagonal matrix, it divides each term in x_i by its corresponding variance. If $\Sigma_x^{-1} = I$ then the metric is the Euclidian distance. Hence the Mahalanobis distance is a generalized form of the Euclidian. Thus the objective function can be stated as

$$\min_{C_k} d_M\,(X, C_k) = \sum_{x_i \epsilon X} d_M\big(x_i, c(x_i)\big) \qquad (2)$$

1.2 Implementation

There exists no closed-form solution for the optimization problem in equation (2) and thus an iterative estimation procedure must be used to find the optimum. A well-known algorithm is the k-centroids algorithm in its general form:

1. set k and initialize a random set of centroids;
2. apply equation (1);
3. update the centroids holding the clusters $c(x_n)$ fixed:

$$c_j = \operatorname*{argmin}_c \sum_{n:c(x_n)=c_j} d(x_n, c), \quad j = 1,\ldots,k$$

4. repeat steps 2 and 3 until convergence.

We classify each bank by using the following $m = 5$ variables:

- net interest income (as a percentage of operating income)
- trading income (as a percentage of operating income)
- income from fees and commissions (as a percentage of operating income)
- loan-to-deposit ratio
- loans (as a percentage of total assets)

These variables cover the aggregate income structure and the aggregate loan structure of banks. For a more detailed description, see section 2. According to this classification, each bank represents a point in a 5-dimensional Hilbert space. We can measure the distance – in other words, the similarity – between any two banks by employing any distance measure (in this analysis we employ the Mahalanobis distance) and determine which banks are close to each other and which banks are scattered further away from the others. The clustering algorithm aims to find and group those points which are relatively close to each other (and hence exhibit high similarity). It is crucial to choose an appropriate number of clusters as the results may vary strongly when k is low, which is usually the case when clustering. The impact can be high when setting $k = 4$ in contrast to $k = 3$. Thus it is necessary to validate any choice of k to allow a stable and meaningful solution. A robust validation can be achieved with many methods and measures but one of the simplest ones is bootstrapping, which we use in this paper (for details, see section 3.1). The resulting clusters of the algorithm should exhibit convexity as well as low intra-cluster and high inter-cluster entropy, meaning that the

elements of one cluster should be as similar as possible, whereas the elements of two different clusters should be as dissimilar as possible. If this is the case then the result is assumed to be stable. Such clusters can be interpreted as groups that share distinctive business models.

1.2.1 Peer Groups Based on the Distance Measure

The peer group G_i of bank x_i is a group consisting of banks with a business structure similar to that of x_i. As already mentioned above, similarity can be derived from the distance of one bank to another bank, thus it is sufficient to set up an m-dimensional sphere with radius r (an ellipsoid in the Mahalanobis definition) around x_i and check which banks are located within that sphere. More formally, we write:

$$x_s \in G_i \text{ if } d_M(x_s, x_i) \leq r \qquad (3)$$

Depending on the position of a bank within a cluster it is possible that this bank might have peers in different clusters. Such would be the case if, e.g., bank i is on the boundary of a certain cluster and bank s is on the verge of a different cluster but the distance between x_s and x_i is small. Even if these two banks belonged to different clusters, they would be found in the same peer group.

1.2.2 Software

Most of the implementation tasks were carried out in the programming language *R*.[3] The clustering technique employed is a k-centroids cluster analysis provided in the *R*-package *flexclust* (see Leisch, 2006). We implement the Mahalanobis measure manually as it was not available in the package. Validation via bootstrapping is also provided in this package (see function *bootFlexclust*).

1.2.3 Validation

As mentioned earlier, the results may significantly depend on the choice of k (number of clusters). Thus it is necessary to validate the choice of k by both statistical tools and by qualitative means. Statistical methods, such as bootstrapping, are powerful tools but they lack the ability to express the meaningfulness of a solution from an economic point of view. The validation tool used in this analysis serves as a guidepost rather than as an irrefutable solution. The bootstrapping algorithm provided in the *flexclust* package estimates k based on the similarity of two subsets (with the possibility of non-empty intersection, i.e. elements of one subset can also occur in the other subset). A k with the highest Rand index indicates the best possible separation of clusters given the number of groups the algorithm has to divide the set into. The pseudo-code of the algorithm for B iterations (bootstrapping samples) is as follows:

1. sample (with replacement) two subsets S_1 and S_2 of the original set S*;
2. apply the clustering algorithm for these two subsets, resulting in partitions p_{S_1} and p_{S_2};
3. calculate the Rand index for each pair of partitions as

$$I_R = \frac{(\sum_{i=1}^{c}\sum_{j=1}^{c} n_{ij}^2 - n) - \frac{1}{2}(\sum_{i=1}^{c} n_{i.}^2 - n) - \frac{1}{2}(\sum_{j=1}^{c} n_{j}^2 - n) + \binom{n}{2}}{\binom{n}{2}}$$

where c is the length of both subsamples and $c \times c$ is the matrix $N = n_{ij}$, where n_{ij} is the number of objects in group i of partition p_{S_1} and group j of partition p_{S_2}.

4. Repeat steps 1 to 3 B times and return the Rand index for each trial.

[3] *R is an open-source statistical programming language, see R Development Core Team (2012).*

2 Data

In this section we explain the construction of the database,[4] how we defined each variable and the characteristics these variables exhibit through descriptive statistics.

2.1 Database and Data Preparation

The time frame of the data set used for our analysis ranges from year-end 2005 to year-end 2011 on a yearly basis. There is a total of 234 European banks covered, including the top 6 Austrian banks. Data points featuring more than two missing values in any of the variables are removed from the sample. The remaining missing values are then interpolated (trailing missing values extrapolated) across time. Based on the results in the existing literature (e.g. Ayadi et al., 2012) and on expert judgement, we construct the following five variables in table 1, bearing in mind that they should be representative of the expected cluster structure (i.e. the business model).

Table 1

Construction of Variables

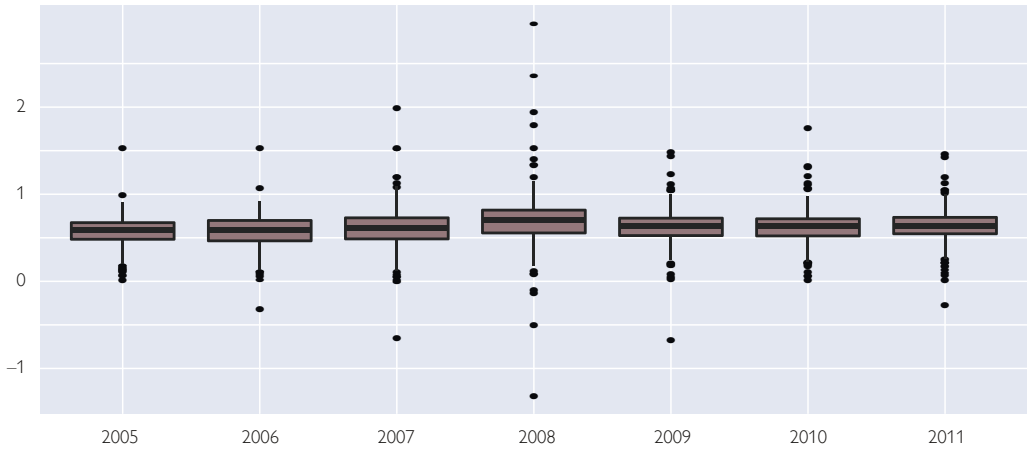
Parameter	Symbol
Net interest income	NII
Trading income	TI
Income from fees and commissions	CI
Operating income	OPINC
Customer deposits	CUSTDEP
Total loans	TOTLOANS
Total assets	SIZE

Variable	Symbol
NII/OPINC	NTR
TI/OPINC	TTR
CI/OPINC	CTR
TOTLOANS/CUSTDEP	LDR
TOTLOANS/SIZE	LAR

Finally, the three-dimensional data cube *(DATA)* comprises the banks in the first dimension, the variables in the second dimension and time in the third dimension. Data normalization was obsolete since the Mahalanobis distance measure used in this clustering analysis is scale-invariant.

Chart 1

Net Interest Income over Operating Income



Source: Authors' calculations.

[4] *The data used are from Bankscope and stem from banks' publicly available financial statements. Bankscope provides information on over 27,600 banks around the world spanning up to 16 years, including detailed accounts (country specific "as reported" and standardized), ratios, ratings and rating reports, ownership, country risk and country finance reports.*

2.2 Descriptive Statistics of the Data Set

2.2.1 Net Interest Income over Operating Income (NTR)

Net interest income is the difference between the revenues from interest-bearing assets and the expenses on interest-burdened non-trading assets. It represents the part of a bank's operating income generated by the interest payment structure. Net interest income as a percentage of operating income is termed NTR, defined as

$$NTR = \frac{\text{gross interest income} + \text{dividend income} - \text{total interest expense}}{\text{operating income}}$$

A high NTR suggests that a bank generates a large part of its overall income through interest income and would therefore be classified as retail bank.

Table 2

NTR Descriptive Statistics

Year	μ	σ	$E[X^3]$	$E[X^4] - 3$
2005	0.563	0.192	−0.083	3.050
2006	0.560	0.206	−0.356	3.069
2007	0.603	0.241	−0.421	4.612
2008	0.693	0.357	1.051	14.626
2009	0.621	0.187	−0.256	1.144
2010	0.626	0.186	−0.332	1.290
2011	0.635	0.212	−0.124	3.356

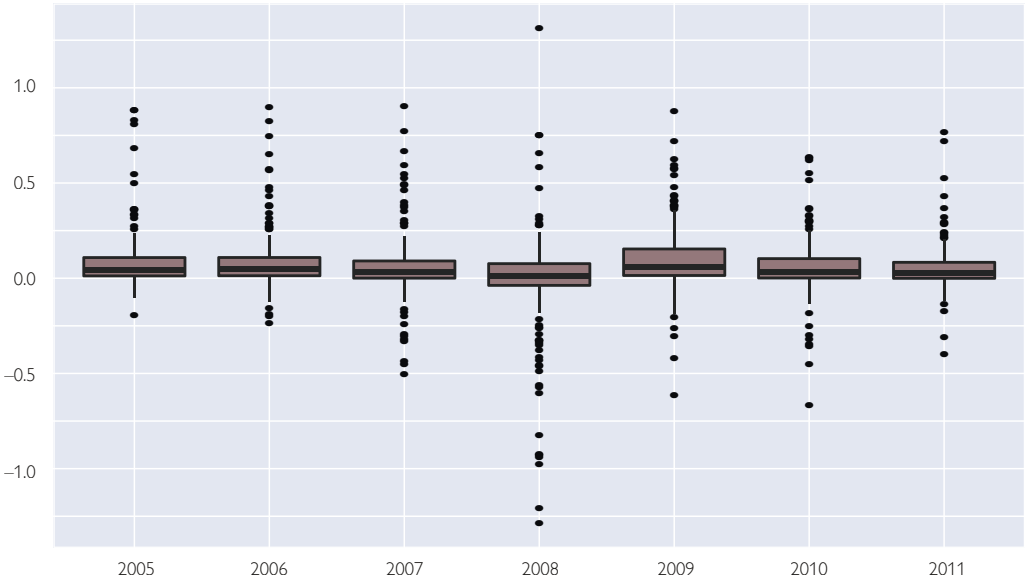
Source: Authors' calculations.

Chart 1 shows the NTR for the whole sample over six years.[5]

Table 2 summarizes the moments of the empirical distributions. One can observe on average a steady increase in the ratio except in the crisis year of 2008, when due to losses in other income structures the NTR increased by approximately 9% compared to 2007.

Chart 2

Trading Income over Operating Income



Source: Authors' calculations.

[5] *In the boxplots, the black horizontal bars represent the median, the red boxes represent 50% of the data around the median (lower part of the box: 25% quartile, upper part: 75% quartile). The upper and lower bounds of the vertical black lines (whiskers) span 95% of the data. The filled circles represent outliers.*

2.2.2 Trading Income over Operating Income (TTR)

Trading income is defined as the net gains (losses) on trading and derivatives. It includes marking to market of derivatives, currently related transactions, interest-rate instruments, equities and other trading assets, excluding insurance-related trading income. The TTR is the fraction of net trading income to operating income and is defined as

$$TTR = \frac{\text{trading income}}{\text{operating income}}$$

A high TTR suggests that a bank generates a large part of its overall income through trading and would therefore be classified as an investment bank. Chart 2 shows the TTR for the whole sample over six years.

Table 3 summarizes the moments of the empirical distributions. One can observe on average a constant ratio again except in the crisis year of 2008, during which the ratio dropped by approximately 7% compared to 2007 and became even negative on the aggregate level.

Table 3

TTR Descriptive Statistics

Year	μ	σ	$E[X^3]$	$E[X^4] - 3$
2005	0.084	0.139	3.416	15.104
2006	0.088	0.147	2.738	9.938
2007	0.057	0.157	1.827	8.137
2008	−0.015	0.266	−0.754	7.669
2009	0.094	0.144	1.614	5.863
2010	0.056	0.130	1.521	6.309
2011	0.049	0.109	1.530	9.776

Source: Authors' calculations.

2.2.3 Income from Fees and Commissions over Operating Income (CTR)

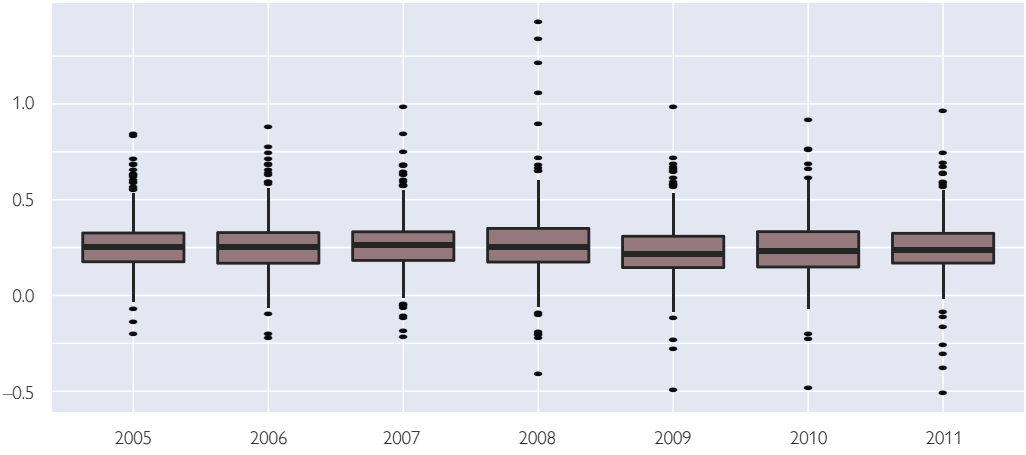
Income from fees and commissions is defined as the income from net fees and commissions which are not related to loans. The CTR is income from fees and commissions over operating income and therefore defined as

$$CTR = \frac{\text{income from fees and commissions}}{\text{operating income}}$$

A higher CTR indicates that a bank generates a larger portion of its income through commissions and fees. This holds true, e.g., for private banks.

Chart 3

Income from Fees and Commissions over Operating Income



Source: Authors' calculations.

Table 4

CTR Descriptive Statistics

Year	μ	σ	$E[X^3]$	$E[X^4] - 3$
2005	0.267	0.148	1.114	2.159
2006	0.264	0.149	1.034	2.274
2007	0.270	0.148	0.750	1.649
2008	0.275	0.212	1.909	8.685
2009	0.234	0.158	0.910	2.821
2010	0.248	0.156	0.762	2.379
2011	0.249	0.160	0.111	4.581

Source: Authors' calculations.

Chart 3 shows the CTR for the whole sample over six years.

Table 4 summarizes the moments of the empirical distributions. One can observe on average a constant ratio over the observed years.

2.2.4 Loan-to-Deposit Ratio (LDR)

The loan-to-deposit ratio (LDR, more commonly also LTD) is defined as

$$LDR = \frac{\text{gross loans}}{\text{total customer deposits}}$$

The numerator includes residential mortgage loans, other mortgage loans, other consumer or retail loans and corporate and commercial loans. The denominator is the sum of current, savings and term deposits. This ratio measures the liquidity of banks. A high ratio indicates low liquidity to cover unexpected funding requirements whereas a low ratio might suggest unrealized profitability in the income structure. Chart 4 shows the LDR for the whole sample in each year.

Table 5 summarizes the moments of the empirical distributions. The LDR increased steadily until end-2007 and then dropped by approximately 25% until end-2011.

Table 5

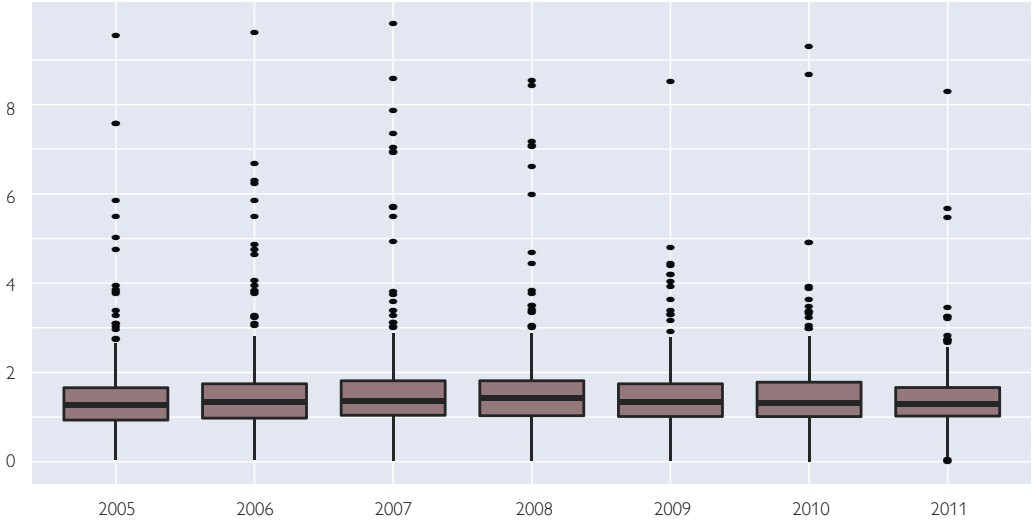
LDR Descriptive Statistics

Year	μ	σ	$E[X^3]$	$E[X^4] - 3$
2005	1.505	0.970	3.891	25.700
2006	1.584	0.826	1.896	6.079
2007	1.699	0.818	2.307	11.223
2008	1.680	0.983	3.123	15.923
2009	1.508	0.704	1.457	4.287
2010	1.511	0.706	1.682	5.666
2011	1.433	0.717	2.248	10.365

Source: Authors' calculations.

Chart 4

Loan-to-Deposit Ratio



Source: Authors' calculations.

2.2.5 Loan-to-Asset Ratio (LAR)

The loan-to-asset ratio (LAR) is defined as

$$LAR = \frac{\text{gross loans}}{\text{total assets}}$$

The numerator is defined identically to the numerator of the LDR. The denominator is the sum of on- and off-balance sheet items. A high LAR indicates that loans represent the bulk of balance sheet items. Chart 5 shows the LAR for the whole sample in each year. Table 6 summarizes the moments of the empirical distributions. Again, one can observe on average a constant ratio over the years.

Table 6

LAR Descriptive Statistics

Year	μ	σ	$E[X^3]$	$E[X^4] - 3$
2005	0.528	0.210	−0.396	−0.649
2006	0.540	0.212	−0.502	−0.554
2007	0.555	0.218	−0.590	−0.548
2008	0.570	0.219	−0.690	−0.417
2009	0.562	0.215	−0.702	−0.230
2010	0.566	0.214	−0.722	−0.198
2011	0.570	0.218	−0.693	−0.196

Source: Authors' calculations.

3 Results

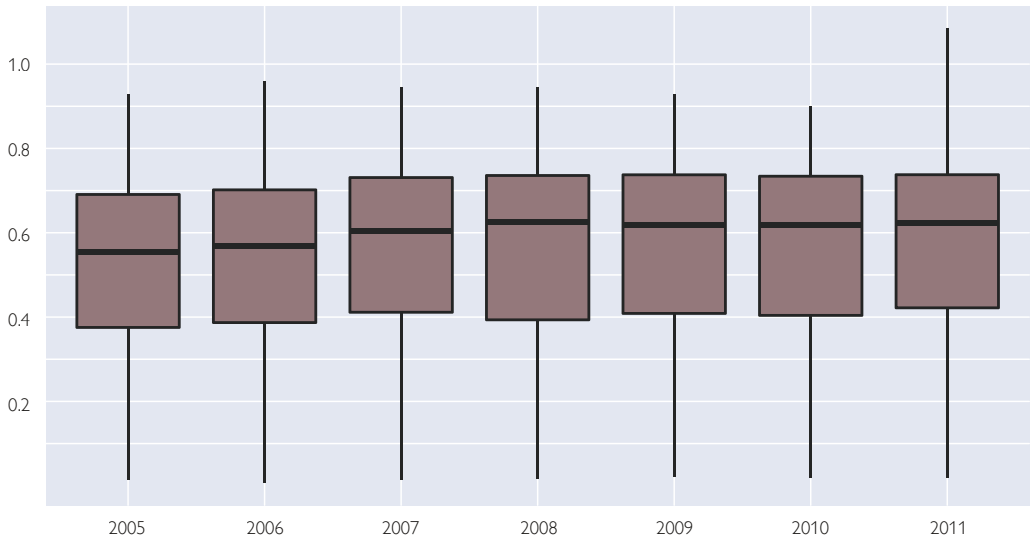
This section first explains how we fixed the optimal number of clusters and then gives an interpretation of each business model derived from the clustering algorithm. Furthermore we identify the peer groups of Austrian banks.

3.1 Determining the Optimal Number of Clusters

As underlined in section 1.2.3 we need to determine k in order for the clustering algorithm to produce plausible results. To this end, we apply the bootstrapping algorithm described in that chapter. For every year spanning the data set we calculate the Rand index, see equation (4), for $k^* \in \{3, 4, \ldots, 8\}$ number of clusters in $B = 300$ iterations. The k^* with the highest Rand index is chosen conditional to plausibility and robustness. Chart 6 shows the results of the bootstrapping algorithm. In most years k between 4 and 6 appears optimal so we choose $k = 5$ for each year to ensure comparability between the clus-

Chart 5

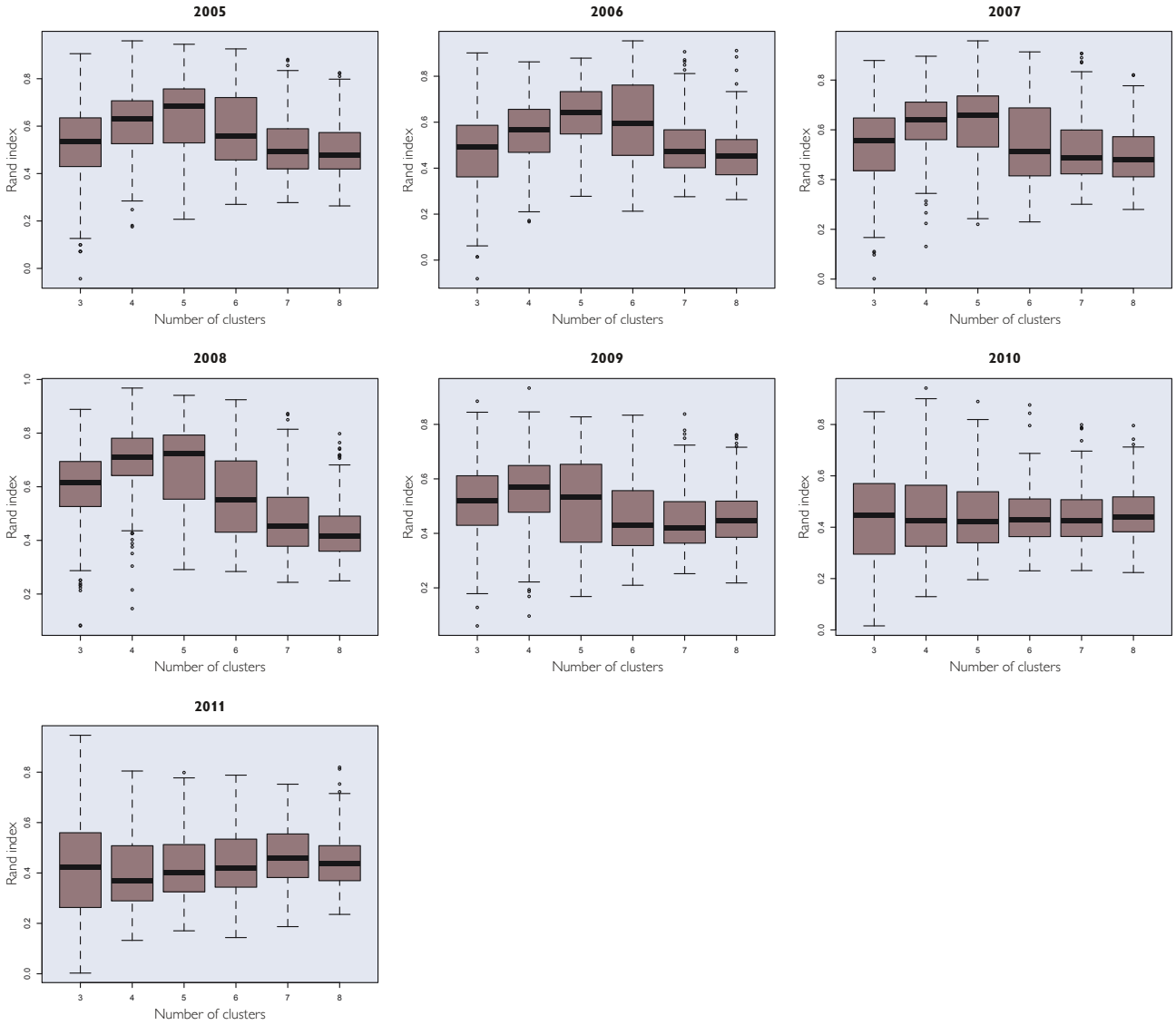
Loan-to-Asset Ratio



Source: Authors' calculations.

Chart 6

Bootstrapping Results with B = 300 Iterations



Source: Authors' calculations.

tering results of each year. The result for 2011, when the optimum was $k = 3$, is an exception. This is partly due to what appears to be a merging of two distinct business models in 2011 and will be explained in detail later in this chapter (section 3.2.4).

3.2 Business Models

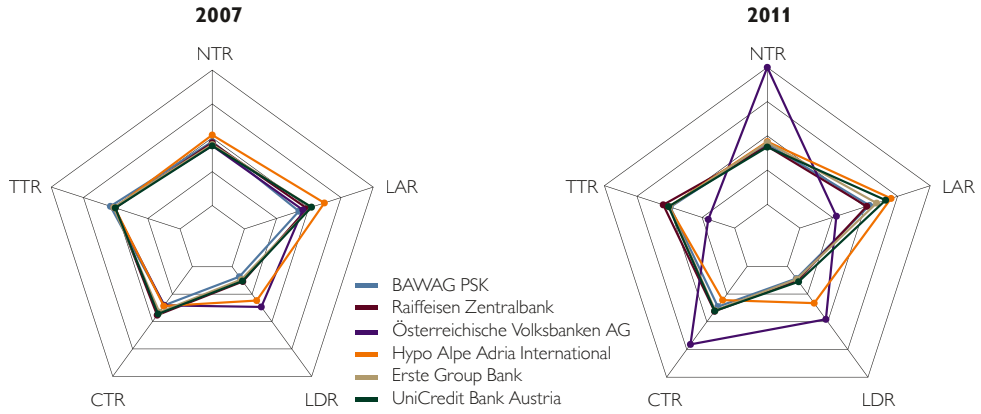
Based on the bootstrapping results we set $k = 5$ and apply the clustering algorithm on the data for each year. The clusters generated in this manner should be easily separable from each other and exhibit different features. From each cluster we try to deduce unique business models for further analysis.

3.2.1 Top 6 Austrian Banks

Chart 7 shows a table and radar charts depicting the business model variables

Chart 7

Business Model Variables of Austria's Top 6 Banks



Bank	NTR		TTR		CTR		LDR		LAR	
	2007	2011	2007	2011	2007	2011	2007	2011	2007	2011
BAWAG PSK	71.00	75.57	11.99	0.03	17.13	19.61	89.24	108.18	46.31	58.27
Raiffeisen Zentralbank	67.46	67.92	2.17	13.95	34.75	27.62	131.97	125.30	53.18	56.03
Österreichische Volksbanken AG	58.20	336.66	5.20	–75.86	17.40	85.57	359.86	468.80	49.65	30.92
Hypo Alpe Adria International	91.99	83.63	3.21	2.27	18.62	8.12	302.71	325.84	67.61	76.06
Erste Group Bank	61.92	81.16	5.54	1.78	29.33	26.08	113.82	113.35	56.83	64.16
UniCredit Bank Austria	57.89	65.10	2.16	3.43	32.56	27.09	127.58	136.19	56.85	71.59

Source: Authors' calculations.

of Austria's top 6 banks. The axes in the chart are scaled by the minimum and the maximum of the total data set. It should be noted that Österreichische Volksbanken AG's data for 2011 are classified as an outlier in our data set and were therefore not used in the cluster analysis. The business models of Erste Group Bank, Raiffeisen Zentralbank, UniCredit Bank Austria and BAWAG PSK are very similar in their composition compared to the rest of the data set. Österreichische Volksbanken AG and Hypo Alpe Adria International exhibit higher loan-to-deposit ratios compared to the other Austrian banks.

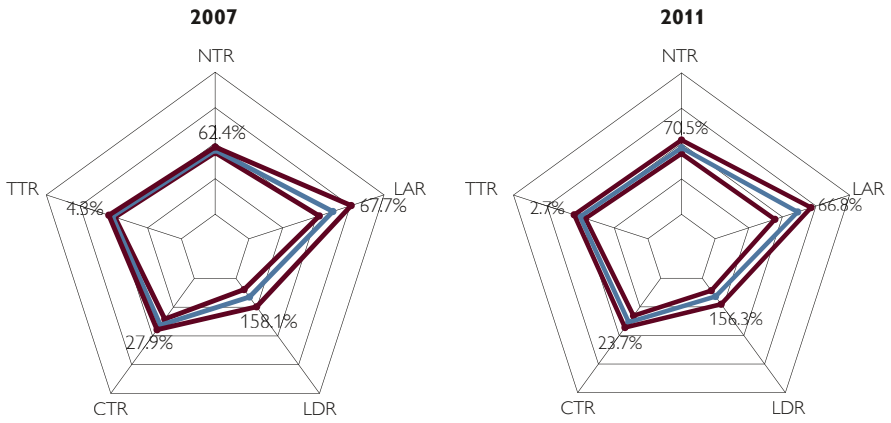
3.2.2 Business Model A

Business model A is characterized by a relatively high NTR and a high LAR, indicating that these banks generate a large portion of their income through interest income. Another notable feature is a medium CTR, pointing out business activities in wealth management. The LDR of approximately 150% is low compared to the whole sample and can be regarded as a balanced ratio.

The business model A group is the largest of the five clusters; it consisted of 125 banks in 2007 but shrank to 81 banks in 2011. Business model A shows the least changes in the five variables over the years. Chart 8 shows that between the pre-crisis year 2007 and 2011 the NTR increased by roughly 8% and the CTR decreased by 4% while the other variables exhibited a constant value. Chart 8 also shows a list of banks representative of the cluster (i.e. in terms of business model). Austria's top 3 banks (Erste Group Bank, UniCredit Bank Austria and Raiffeisen Zentralbank) are members of this group.

Chart 8

Business Model A

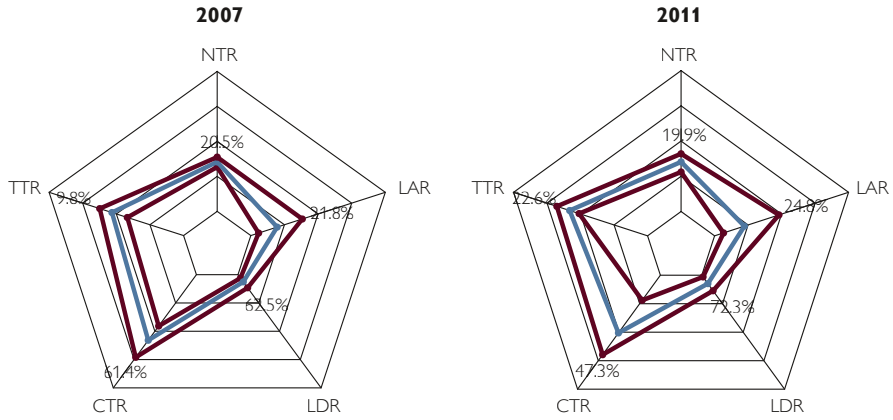


Bank name	Country	Total assets 2011 in EUR billion
Banco Santander	ES	1,251
Uni Credit SpA	IT	926
Nordea Bank	SE	716
Intesa Sanpaolo	IT	639
Danske Bank	DK	460
Svenska Handelsbanken	SE	275
DnB	NO	274
Sberbank of Russia	RU	260
Erste Group Bank	**AT**	**210**
UniCredit Bank Austria	**AT**	**199**
Raiffeisen Zentralbank	**AT**	**150**
Banco Popolare	IT	134
Banco Popular Espanol	ES	130
Le Crédit Lyonnais	FR	122
PKO Bank Polski	PL	43
Jyske Bank Group	DK	36

Source: Authors' calculations, Bankscope.

Chart 9

Business Model B



Bank name	Country	Total assets 2011 in EUR billion
Deutsche Bank AG	DE	2,164
Barclays Bank Plc	GB	1,868
UBS AG	CH	1,166
Credit Suisse Group AG	CH	862
DekaBank Deutsche Girozentrale	DE	134
Investec Plc	GB	26
Banque Internationale à Luxembourg SA	LU	24
EFG International	CH	17
Schroders Plc	GB	17
Vontobel Holding AG-Vontobel Group	CH	15
Union Bancaire Privée – UBP Banque Privée Edmond de Rothschild S.A., Geneve	CH	15
	CH	12

Source: Authors' calculations, Bankscope.

3.2.3 Business Model B

Business model B as depicted in chart 9 is characterized by a high CTR, a low LDR and a low LAR. The list of banks representative of this business model mainly consists of private banks or wealth management companies with smaller total assets. But the cluster is also defined by some large universal banks with significant investment banking operations.

3.2.4 Business Model C

Business model C is mainly characterized by a high TTR. The banks representative of this group are large international banks with investment banking activities. This cluster is similar to business model B. As mentioned before, this similarity was also visible in the bootstrapping results, which showed that only three clusters would have been optimal for the 2011 data.

3.2.5 Business Model D

Business model D in chart 11 is characterized by a high NTR, a low LAR and a medium LDR. Universal banks with strong retail operations are typical representatives of the business model D group. Of the Austrian banks, BAWAG PSK is a member of this group.

3.2.6 Business Model E

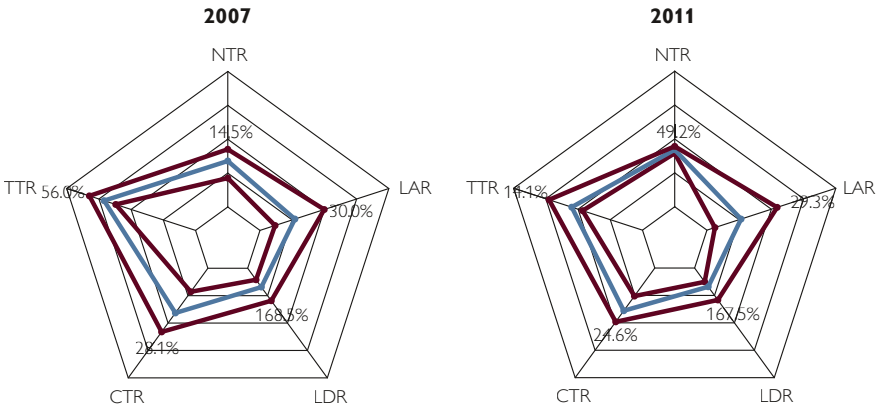
Business model E is characterized by a very high LDR and a high NTR, see chart 12. Some of these banks received state guarantees, which could explain their high loan-to-deposit ratios.

3.3 Clustering with Pooled Data

For the results presented above, we ran the clustering algorithm for each year. The shortcoming of this method was that we had to identify the order of the business models for each year because the group labels (i.e. the cluster numbering) could switch over time. A simple approach to avoid this is to pool the observations over time, i.e., our data cube becomes two-dimensional (banks, variables). The majority of Austrian banks belongs to the largest cluster, which represents – as before – business

Chart 10

Business Model C

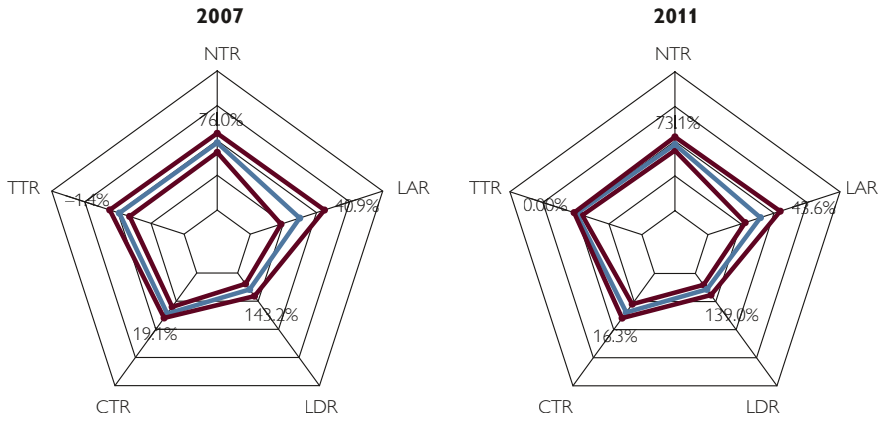


Bank name	Country	Total assets 2011 in EUR billion
Société Générale	FR	1,181
Lloyds Banking Group Plc	GB	1,160
Credit Agricole Corporate and Investment Bank-Credit Agricole CIB	FR	826
Natixis	FR	508
Fédération du Crédit Mutuel Centre Est Europe	FR	468
Merrill Lynch International Bank Limited	IE	459
HSBC France	FR	221
Standard Bank Plc	GB	21

Source: Authors' calculations, Bankscope.

Chart 11

Business Model D



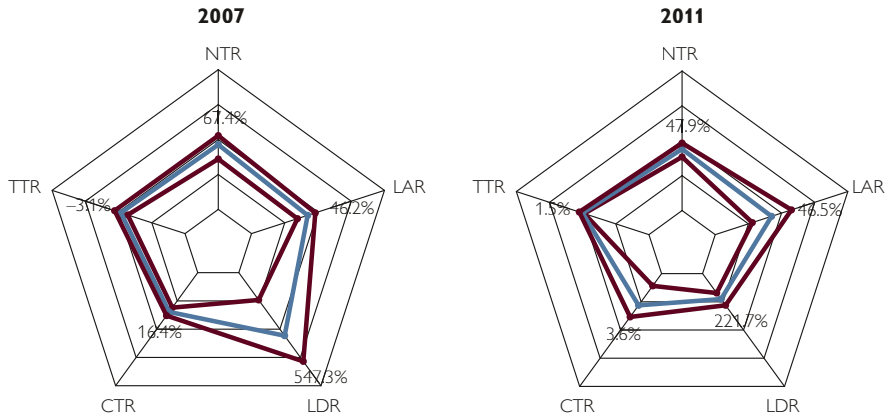
Bank name	Country	Total assets 2011 in EUR billion
BNP Paribas	FR	1,965
ING Bank NV	NL	961
DZ Bank AG-Deutsche Zentral-Genossen-schaftsbank	DE	406
UniCredit Bank AG	AT	386
Landesbank Baden-Württemberg	DE	373
Bayerische Landesbank	DE	309
Landesbank Hessen-Thüringen Girozentrale – HELABA	DE	164
WGZ-Bank AG Westdeutsche Genossenschafts-Zentralbank	DE	94
AXA Bank Europe SA/NV	BE	42
BAWAG PSK Group	**AT**	**41**

Source: Authors' calculations, Bankscope.

model A. BAWAG PSK Group is in the business model D group until 2009, but is assigned to business model A group for the years afterwards. This seems plausible because until 2009 the bank clustered more with retail-oriented banks, but in 2010 and 2011 BAWAG PSK Group showed a higher degree of similarity with the majority of banks in the business model A group. Chart 13 displays the bootstrapping results for determining the optimal number of clusters. For the pooled data setting $k = 3$ would be optimal, which is the

Chart 12

Business Model E

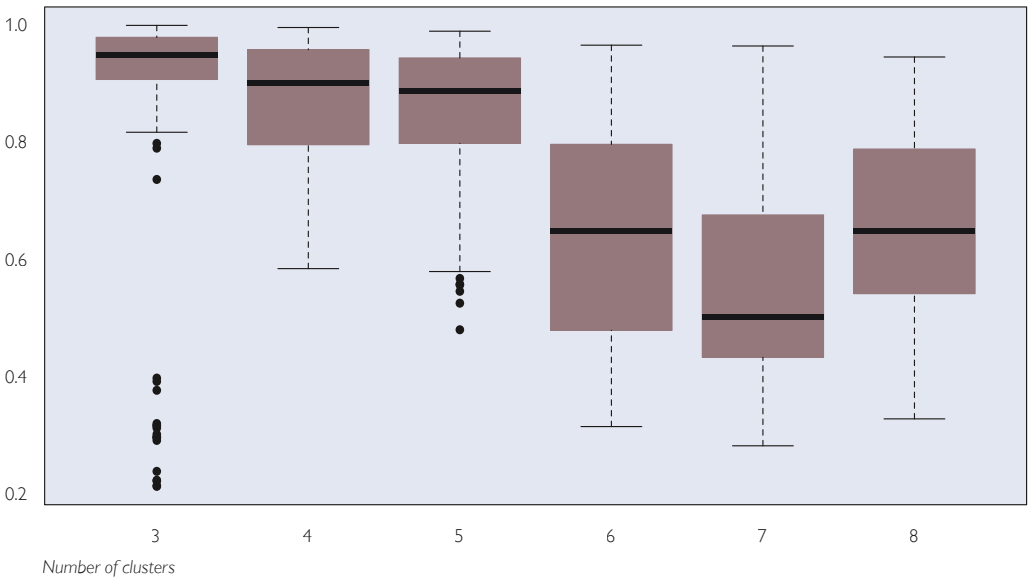


Bank name	Country	Total assets 2011 in EUR billion
Hypo Real Estate Holding AG	DE	237
Landesbank Hessen-Thüringen Girozentrale – HELABA	DE	164
Mediobanca SpA	IT	75
Pohjola Bank plc-Pohjola Pankki Oyj	FI	41
IKB Deutsche Industriebank AG	DE	31

Source: Authors' calculations, Bankscope.

Chart 13

Bootstrapping Results with Pooled Data (B = 300 Iterations)



Source: Authors' calculations.

result of combining the data for all years. In chart 6 we see that up to 2009 five business models were optimal. In the last three years the optimal number decreased to three, which is also reflected in the pooled data.

3.4 Peer Group of Austrian Banks

A peer of a certain bank is a bank whose ratios as defined in section 2 are similar to the other bank's ratios. Hence it is sufficient to consider those banks as peers that exhibit a small distance to this specific bank according to formula 3 in chapter 1.2.1.

Radius r is chosen according to the mean distances of the members of the business model group the peer group should belong to. If r is large (small) then the peer group contains many (few) elements. Erste Bank Group, Raiffeisen Zentralbank and UniCredit Bank Austria are close to each other, therefore we can define an aggregate peer group for the top 3 Austrian banks. As the banks' position in χ varies over the years, some banks belong to the peer group of the aforementioned banks in some years whereas in other years they do not. The top 3 Austrian banks are assigned to the business model A group (status of 2011). The members of this group have a mean pairwise distance of *1.4,* therefore setting the radius $r = 1.4$ seems to be most plausible. The peer group is shown in table 7 (omitting those banks with total assets below EUR 50 billion): Most of the banks in this peer group are linked with business model A and C. This suggests that the top three Austrian banks are mostly found within the business model A group, though they are not located exactly at the centroid but at some distance, deviating toward business model C.

Table 7

Peer Group of Austrian Banks

Name	Country	Business model	Total assets at end-2011
			EUR billion
KBC Bank	BE	A	241
Zurich Cantonal Bank	CH	A	101
Komerční banka	CZ	A	28
Deutsche Postbank	DE	A	215
Jyske Bank	DK	D	33
Banco Santander	ES	A	1,218
Banco Bilbao Vizcaya Argentaria	ES	A	553
Caja de Ahorros y Pensiones de Barcelona – LA CAIXA	ES	C	286
Banco Popular Español	ES	A	130
HSBC Holdings	GB	D	1,837
Standard Chartered Bank	GB	B	386
OTP Bank	HU	A	33
UniCredit	IT	C	929
Intesa Sanpaolo	IT	C	659
Banca Monte dei Paschi di Siena	IT	C	244
Banco Popolare	IT	C	135
ING Bank	NL	A	933
DnB	NO	A	237
Powszechna Kasa Oszczędności Bank Polski	PL	A	43
Banco Espirito Santo SA	PT	C	83
Banco Comercial Português, SA-Millennium	PT	C	100
Sberbank of Russia	RU	A	212
Nordea Bank	SE	B	581
NLB dd-Nova Ljubljanska banka	SI	A	18
Türkiye Garanti Bankasi	TR	A	66

Source: Authors' calculations, Bankscope.

4 Summary

This paper shows the first results of a statistical methodology to cluster the business models of a large sample of European banks and to identify peer groups for selected banks. The analysis is based on publicly available data from banks' financial statements. We define five variables to describe the business model of a bank. A *k*-centroids clustering method based on the Mahalanobis distance is used for assigning the banks to groups that represent specific business models. We find that European banks can be grouped by five distinct business models. We provide a list of reference banks for each business model. Furthermore, we derive a peer group for Austria's top three banks based on our statistical methodology. The impact of the financial crisis on banks was clearly visible in our results, showing that banks have adapted their business models in the wake of the crisis.

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Annex of Tables

Annex of Tables

Cutoff date for data: November 15, 2012

Conventions used in the tables:

x = No data can be indicated for technical reasons

. . = Data not available at the reporting date

Revisions of data published in earlier volumes are not indicated.

Discrepancies may arise from rounding.

International Environment

Table A1

Exchange Rates

	2008	2009	2010	2011	2009	2010	2011	2012
	Year				1st half			
	Period average (per EUR 1)							
U.S. dollar	1.47	1.39	1.33	1.39	1.45	1.33	1.33	1.40
Japanese yen	152.35	130.35	116.38	110.99	130.28	127.27	121.53	115.02
Pound sterling	0.80	0.89	0.86	0.87	0.89	0.89	0.87	0.87
Swiss franc	1.59	1.51	1.38	1.23	1.51	1.51	1.44	1.27
Czech koruna	24.96	26.45	25.29	24.59	27.15	25.73	24.35	25.17
Hungarian forint	251.74	280.54	275.36	279.31	289.99	271.64	269.42	295.39
Polish zloty	3.52	4.33	3.99	4.12	4.47	4.00	3.95	4.24
Slovak koruna[1]	31.27	..	..	..	..	..	..	..

Source: Thomson Reuters.

[1] From January 1, 2009: irrevocable conversion rate against the euro.

Table A2

Key Interest Rates

	2008	2009		2010		2011		2012
	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30
	End of period, %							
Euro area	2.50	1.00	1.00	1.00	1.00	1.25	1.00	1.00
U.S.A.	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Japan	0.100	0.110	0.094	0.096	0.08	0.070	0.080	0.070
United Kingdom	2.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Switzerland[1]	0.00–1.00	0.00–0.75	0.00–0.75	0.00–0.75	0.00–0.75	0.00–0.75	0.00–0.25	0.00–0.25
Czech Republic	2.25	1.50	1.00	0.75	0.75	0.75	0.75	0.50
Hungary	10.00	9.50	6.25	5.25	5.75	6.00	7.00	7.00
Poland	5.00	3.50	3.50	3.50	3.50	4.50	4.50	4.75
Slovakia[2]	2.50	..	..	..	..	..	..	..

Source: Eurostat, Thomson Reuters, national sources.

[1] SNB target range for three-month LIBOR.
[2] From 2009 onward: see euro area.

Table A3

Short-Term Interest Rates

	2008	2009	2010	2011	2009	2010	2011	2012
	Year				1st half			
	Three-month rates, period average, %							
Euro area	4.63	1.23	0.81	0.84	1.67	0.67	1.26	0.87
U.S.A.	2.92	0.69	0.34	0.35	1.05	0.35	0.28	0.49
Japan	0.85	0.59	0.39	0.38	0.66	0.42	0.34	0.34
United Kingdom	5.49	1.22	0.74	0.75	1.72	0.68	0.82	1.05
Switzerland	2.57	0.37	0.19	0.18	0.45	0.21	0.18	0.09
Czech Republic	3.10	4.04	2.19	1.31	2.52	1.41	1.21	1.22
Hungary	7.75	8.87	8.64	5.51	9.64	5.61	6.07	7.32
Poland	4.74	6.36	4.42	3.92	4.63	3.99	4.26	5.00
Slovakia[1]	4.34	..	..	..	..	..	..	..

Source: Bloomberg, Eurostat, Thomson Reuters.

[1] *From 2009 onward: see euro area.*

Table A4

Long-Term Interest Rates

	2008	2009	2010	2011	2009	2010	2011	2012
	Year				1st half			
	Ten-year rates, period average, %							
Euro area	4.24	3.71	3.34	3.86	3.79	3.45	5.36	3.46
U.S.A.	4.22	4.07	4.25	3.91	3.81	4.49	4.45	3.04
Japan	1.49	1.34	1.17	1.12	1.36	1.30	1.21	0.93
United Kingdom	4.49	3.66	3.58	3.06	3.54	3.87	3.58	1.96
Switzerland	2.90	2.20	1.63	1.47	2.30	1.81	1.89	0.72
Czech Republic	4.63	4.84	3.88	3.71	4.98	4.14	3.97	3.33
Hungary	8.24	9.12	7.28	7.64	10.31	7.29	7.29	8.71
Poland	6.07	6.12	5.78	5.96	6.08	5.85	6.15	5.44
Slovakia	4.72	4.71	3.87	4.45	4.87	3.95	4.30	4.92
Slovenia	4.61	4.38	3.83	4.97	4.75	3.90	4.40	5.62

Source: Eurostat, national sources.

Table A5

Corporate Bond Spreads

	2008	2009	2010	2011	2009	2010	2011	2012
	Year				1st half			
	Period average, percentage points							
	Spreads of 7- to 10-year euro area corporate bonds against euro area government bonds of the same maturity							
AAA	0.70	0.69	–0.03	–0.41	0.97	0.01	–0.25	–0.89
BBB	3.55	4.65	2.06	2.18	6.31	2.06	1.62	2.08
	Spreads of 7- to 10-year U.S. corporate bonds against U.S. government bonds of the same maturity							
AAA	2.09	1.64	0.70	0.90	2.50	0.70	0.74	0.71
BBB	4.16	4.51	2.21	2.34	6.05	2.18	1.91	2.77

Source: Merrill Lynch via Thomson Reuters.

Table A6

Stock Indices[1]

	2008	2009	2010	2011	2009	2010	2011	2012
	Year				1st half			
	Period average							
Euro area: Euro Stoxx	314	234	266	256	210	265	283	234
U.S.A.: S&P 500	1,222	947	1,140	1,268	851	1,129	1,311	1,348
Japan: Nikkei 225	12,162	9,337	10,028	9,431	8,627	10,450	9,951	9,157
Austria: ATX	3,364	2,131	2,558	2,466	1,804	2,529	2,837	2,053
Czech Republic: PX50	1,359	962	1,171	1,111	818	1,183	1,241	938
Hungary: BUX	19,744	16,043	22,480	20,532	12,692	22,531	22,990	17,987
Poland: WIG	40,681	32,004	42,741	44,605	26,771	40,894	48,467	40,016
Slovakia: SAX16	431	318	226	228	338	230	235	202
Slovenia: SBI TOP	1,683	975	891	726	917	948	803	574

Source: Thomson Reuters.

[1] *Euro Stoxx: December 31, 1991 = 100, S&P 500: November 21, 1996 = 100, Nikkei 225: April 3, 1950 = 100, ATX: January 2, 1991 = 1,000, PX50: April 6, 1994 = 1,000, BUX: January 2, 1991 = 1,000, WIG: April 16, 1991 = 1,000, SAX16: September 14, 1993 = 100, SBI TOP: March 31, 2006 = 1,000.*

Table A7

Gross Domestic Product

	2008	2009	2010	2011	2009	2010	2011	2012
	Year				1st half			
	Annual change in %, period average							
Euro area	0.4	–4.3	1.9	1.4	–5.2	1.5	2.0	–0.3
U.S.A.	–0.3	–3.5	3.0	1.7	–4.8	2.8	1.9	2.4
Japan	–1.0	–5.5	4.4	–0.9	–8.5	4.4	–0.8	3.2
Austria	1.4	–3.8	2.3	3.1	–5.3	1.6	3.8	1.1
Czech Republic	3.1	–4.7	2.7	1.7	–4.9	2.3	2.6	–0.9
Hungary	0.9	–6.8	1.3	1.6	–7.7	0.6	2.0	–1.0
Poland	5.1	1.6	3.9	4.3	0.8	3.2	4.3	2.9
Slovakia	5.8	–4.9	4.2	3.3	–5.4	4.6	3.5	2.9
Slovenia	3.4	–7.8	1.2	0.6	–8.8	0.4	2.0	–1.6

Source: Eurostat, national sources.

Table A8

Current Account

	2008	2009	2010	2011	2009	2010	2011	2012
	Year				1st half			
	% of GDP, cumulative							
Euro area	–0.7	–0.1	0.1	–0.1	–0.9	–0.5	–0.7	0.3
U.S.A.	–4.8	–3.3	–3.3	–3.3	–2.6	–3.3	–3.2	–3.6
Japan	3.3	2.8	3.5	2.9	2.6	3.8	2.4	..
Austria	4.9	3.0	3.2	2.7	3.2	4.2	1.2	2.3
Czech Republic	–2.1	–2.4	–3.9	–2.9	–2.2	–0.3	–1.9	0.9
Hungary	–7.3	–0.2	1.1	0.9	–1.3	1.1	1.1	1.1
Poland	–6.6	–3.9	–4.6	–4.5	–3.3	–3.0	–3.6	–3.7
Slovakia	–6.1	–2.6	–2.5	0.1	–3.8	–0.9	–0.5	2.5
Slovenia	–6.9	–1.3	–0.8	0.0	–1.0	–0.7	0.7	1.4

Source: Eurostat, European Commission, Thomson Reuters, national sources.

Note: Due to seasonal fluctuations, the comparability of half-year figures with yearly figures is limited. The half-year figures for the U.S.A. are based on seasonally adjusted nominal GDP data.

Table A9

Inflation

	2008	2009	2010	2011	2009	2010	2011	2012
	Year				1st half			
	Annual change in %, period average							
Euro area	3.3	0.3	1.6	2.7	0.6	1.4	2.6	2.6
U.S.A.	3.8	–0.4	1.6	3.2	–0.6	2.1	2.8	2.4
Japan	1.4	–1.4	–0.7	–0.3	–0.6	–1.1	–0.5	0.2
Austria	3.2	0.4	1.7	3.6	0.6	1.5	3.3	2.5
Czech Republic	6.3	0.6	1.2	2.1	1.2	0.7	1.9	3.9
Hungary	6.0	4.0	4.7	3.9	3.1	5.5	4.1	5.6
Poland	4.2	4.0	2.7	3.9	3.9	2.9	3.8	4.1
Slovakia	3.9	0.9	0.7	4.1	1.7	0.3	3.8	3.8
Slovenia	5.5	0.9	2.1	2.1	1.1	2.1	2.1	2.5

Source: Eurostat.

The Real Economy in Austria

Table A10

Financial Investment of Households[1]

	2008	2009	2010	2011	2009	2010	2011	2012
	Year				1st half			
	Transactions, EUR million							
Currency and deposits[2]	13,324	9,115	3,371	7,046	7,215	2,264	3,369	5,068
Securities (other than shares)[3]	5,400	–237	865	1,252	–369	155	1,507	–267
Shares (other than mutual fund shares)	1,340	1,018	1,515	719	932	534	–92	378
Mutual fund shares	–4,670	948	2,965	–1,562	–272	893	–630	111
Insurance technical reserves	3,059	4,840	3,910	2,072	2,874	2,443	1,817	1,488
Total financial investment	18,453	15,684	12,626	9,527	10,380	6,289	5,971	6,778

Source: OeNB.

[1] Including nonprofit institutions serving households.
[2] Including loans and other assets.
[3] Including financial derivatives.

Table A11

Household[1] Income, Savings and Credit Demand

	2008	2009	2010	2011
	Year			
	Year-end, EUR billion			
Net disposable income	168.4	169.4	171.5	176.1
Savings	19.4	19.2	15.7	13.0
Saving ratio in %[2]	11.5	11.2	9.1	7.4
MFI loans to households	132.3	132.6	139.7	142.8

Source: Statistics Austria (national accounts broken down by sectors), OeNB (financial accounts).

[1] Including nonprofit institutions serving households.
[2] Saving ratio = savings / (disposable income + increase in accrued occupational pension benefits).

Table A12

Financing of Nonfinancial Corporations

	2008	2009	2010	2011	2009	2010	2011	2012
	Year				1st half			
	Transactions, EUR million							
Securities (other than shares)	2,954	5,939	3,848	6,257	3,231	2,130	2,412	3,585
Loans	12,680	–16,766	14,386	3,399	–10,248	4,177	1,401	3,458
Shares and other equity[1]	4,931	3,781	–22,672	12,666	205	988	7,898	815
Other accounts payable	–5,075	–5,235	7,601	2,884	–2,770	3,783	2,146	1,540
Total debt	15,490	–12,281	3,163	25,205	–9,582	11,077	13,857	9,398

Source: OeNB.

[1] Including other equity of domestic special purpose entities held by nonresidents.

Table A13

Insolvency Indicators

	2008	2009	2010	2011	2009	2010	2011	2012
	Year				1st half			
	EUR million							
Default liabilities	2,969	4,035	4,700	2,775	1,978	1,587	1,157	1,422
	Number							
Defaults	3,270	3,741	3,522	3,260	1,904	1,724	1,657	1,816

Source: Kreditschutzverband von 1870.

Table A14

Selected Financial Statement Ratios of the Manufacturing Sector

	2008	2009	2010	2011
	Year			
	Median, %			
Self-financing and investment ratios				
Cash flow, as a percentage of turnover	7.77	7.45	7.47	..
Investment ratio[1]	1.78	1.69	1.57	..
Reinvestment ratio[2]	64.10	56.32	57.85	..
Financial structure ratios				
Equity ratio	20.81	22.91	25.49	..
Risk-weighted capital ratio	26.32	28.70	31.94	..
Bank liability ratio	33.49	33.13	28.80	..
Government debt ratio	8.02	7.42	7.71	..

Source: OeNB.

[1] *Investments x 100 / net turnover.*
[2] *Investments x 100 / credit write-offs.*

Financial Intermediaries in Austria[1]

Table A15

Total Assets and Off-Balance-Sheet Operations

	2008	2009		2010		2011		2012
	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30
	End of period, EUR million							
Total assets on an unconsolidated basis	1,069	1,058	1,029	1,027	979	993	1,014	1,011
of which: total domestic assets	693	693	691	675	660	663	693	697
total foreign assets	377	365	338	352	319	330	321	314
Interest rate contracts	1,723	1,755	1,836	2,067	1,397	1,505	1,430	1,357
Foreign exchange derivatives	507	454	419	492	273	261	275	280
Other derivatives	28	30	25	27	17	20	16	17
Derivatives total	2,257	2,239	2,281	2,587	1,687	1,786	1,721	1,654
Total assets on a consolidated basis	1,176	1,159	1,140	1,193	1,131	1,137	1,166	1,189

Source: OeNB.

Note: Data on off-balance-sheet operations refer to nominal values.

Table A16

Profitability on an Unconsolidated Basis

	2009	2010	2011	2012	2008	2009	2010	2011
	1st half				Year			
	End of period, EUR million							
Net interest income	4,396	4,584	4,676	4,503	8,248	8,777	9,123	9,624
Income from securities and participating interests	1,492	1,575	2,038	1,816	7,193	3,327	4,026	3,662
Net fee-based income	1,810	1,970	1,964	1,901	4,218	3,603	3,950	3,835
Net profit/loss on financial operations	338	454	366	335	-812	486	664	325
Other operating income	737	766	848	994	1,710	1,653	1,942	1,786
Operating income	8,773	9,348	9,892	9,551	20,557	17,846	19,706	19,232
Staff costs	2,870	2,839	2,963	2,985	5,776	5,697	5,802	6,002
Other administrative expenses	1,839	1,888	1,962	1,992	3,952	3,765	3,940	4,029
Other operating expenses	734	807	764	804	1,688	1,056	1,252	1,179
Total operating expenses	5,443	5,534	5,689	5,781	11,416	11,077	11,547	11,718
Operating profit/loss	3,331	3,813	4,203	3,770	9,141	6,769	8,159	7,515
Net risk provisions from credit business	3,043	3,404	2,199	2,114	4,201	4,422	2,802	2,427
Net risk provisions from securities business	421	–43	169	–326	2,801	4,090	520	3,276
Annual surplus[1]	2,536	2,974	3,876	3,577	1,891	43	4,231	1,212
Return on assets[1, 2]	0.2	0.3	0.4	0.4	0.2	0.0	0.4	0.1
Return on equity (tier 1 capital)[1, 2]	3.7	4.1	5.2	4.8	3.0	0.1	5.8	1.6
Interest income to gross income (%)	50	49	47	47	40	49	46	50
Operating expenses to gross income (%)	62	59	58	61	56	62	59	61

Source: OeNB.

[1] Annual surplus in % of total assets and tier 1 capital, respectively.
[2] Retrospective modification due to a change in calculation.

[1] *Since 2007, the International Monetary Fund (IMF) has published Financial Soundness Indicators (FSI) for Austria (see also www.imf.org). In contrast to some FSIs which take only domestically owned banks into account, the Financial Stability Report analyzes all banks operating in Austria. For this reason, some of the figures presented here might deviate from the figures published by the IMF.*

Table A17

Profitability on a Consolidated Basis

	2009	2010	2011	2012	2008	2009	2010	2011
	1st half				Year			
	End of period, EUR million							
Operating income	19,215	18,497	18,749	18,939	33,642	37,850	37,508	37,207
Operating expenses[1]	7,794	7,944	8,249	8,307	16,530	15,502	16,204	16,594
Operating profit/loss	8,450	6,612	6,529	6,525	7,855	15,620	13,478	10,369
Net profit after taxes	2,301	1,789	2,897	3,031	586	1,530	4,577	711
Return on assets[2, 5]	0.5	0.4	0.6	0.5	0.1	0.2	0.5	0.1
Return on equity (tier 1 capital)[2, 5]	9.7	6.3	9.8	8.8	2.1	3.6	8.2	1.9
Interest income to gross income (%)[3]	57	64	65	61	69	59	64	66
Cost-income ratio (%)[4]	51	58	58	59	72	53	58	66

Source: OeNB.

[1] As from 2008, operating expenses refer to staff costs and other administrative expenses only.
[2] End-of-period result expected for the full year before minority interests as a percentage of average total assets and average tier 1 capital, respectively.
[3] All figures represent the ratio of net interest income to total operating income less other operating expenses.
[4] All figures represent the ratio of total operating expenses less other operating expenses to total operating income less other operating expenses.
[5] Retrospective modification due to a change in calculation.

Note: Due to changes in reporting, the comparability of consolidated values as from 2008 with earlier values is limited.

Table A18

Sectoral Distribution of Loans

	2008	2009		2010		2011		2012
	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30
	End of period, EUR million							
Nonfinancial corporations	133,608	131,971	130,206	131,744	133,302	134,176	136,913	138,627
of which: foreign currency-denominated loans	*12,134*	*11,263*	*11,106*	*12,150*	*12,197*	*12,080*	*11,804*	*10,913*
Households[1]	124,221	122,378	128,224	128,221	131,288	133,370	134,520	135,031
of which: foreign currency-denominated loans	*38,182*	*36,271*	*36,127*	*38,317*	*39,041*	*39,228*	*37,725*	*35,942*
General government	25,073	25,994	26,116	27,324	27,174	27,930	29,953	28,518
of which: foreign currency-denominated loans	*1,652*	*1,709*	*1,742*	*2,797*	*2,761*	*3,156*	*3,408*	*3,283*
Other financial intermediaries	25,770	25,251	24,516	24,454	22,827	22,056	21,612	21,439
of which: foreign currency-denominated loans	*3,529*	*3,381*	*3,348*	*3,736*	*3,487*	*3,316*	*3,131*	*2,997*
Foreign nonbanks	125,694	121,922	117,726	120,890	117,412	119,822	123,479	124,023
of which: foreign currency-denominated loans	*42,600*	*38,319*	*36,100*	*40,274*	*38,286*	*38,656*	*41,242*	*41,291*
Nonbanks total	434,366	427,515	426,788	432,633	432,003	437,354	446,477	447,638
of which: foreign currency-denominated loans	*98,096*	*90,942*	*88,423*	*97,274*	*95,772*	*96,436*	*97,310*	*94,426*
Banks	363,123	353,198	333,865	334,777	281,989	300,374	294,261	299,794
of which: foreign currency-denominated loans	*108,405*	*96,271*	*83,728*	*76,629*	*64,293*	*67,835*	*65,033*	*67,497*

Source: OeNB.

[1] Including nonprofit institutions serving households.

Note: Figures are based on supervisory statistics and therefore differ from monetary figures used in the text.

Table A19

Foreign Currency-Denominated Claims on Domestic Non-MFIs

	2008	2009		2010		2011		2012
	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30
	End of period, % of total foreign currency-denominated claims on domestic non-MFIs[1]							
Swiss franc	86.4	86.4	86.3	85.5	86.6	87.2	86.0	85.5
Japanese yen	5.5	5.4	5.4	5.9	5.8	5.4	6.3	6.4
U.S. dollar	7.0	6.7	6.7	7.2	6.1	5.9	6.1	6.6
Other foreign currencies	1.1	1.5	1.6	1.4	1.5	1.5	1.6	1.5

Source: OeNB, ECB.

[1] The indicated figures refer to claims of monetary financial institutions (MFIs, ESA definition) on domestic non-MFIs. Given the differences in the definition of credit institutions according to the Austrian Banking Act and of MFIs according to ESA and differences in the number of borrowers, comparability to "Claims on Domestic Nonbanks" is limited. Due to rounding, figures do not add up to 100% for every year.

Table A20

Loan Quality

	2008	2009		2010		2011		2012
	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30
	End of period, % of claims							
Specific loan loss provisions for loans to nonbanks (unconsolidated)	2.2	2.5	2.8	3.1	3.2	3.2	3.2	3.2
Specific loan loss provisions for loans to nonbanks (consolidated)[1]	2.4	2.9	3.5	3.9	4.1	4.3	4.3	4.5
Nonperforming loan ratio (unconsolidated)[2]	3.0	4.3	4.2	4.4	4.7	4.6	4.5	4.6
Nonperforming loan ratio (consolidated)[2]	×	×	6.7	7.6	8.0	8.3	8.3	9.1

Source: OeNB.

[1] Estimate.

[2] Estimate for loans to corporates and housholds. This ratio is published for the first time in this issue of the Financial Stability Report to better indicate the loan quality in the retail business; it is not comparable to ratios that have been used previously.

Table A21

Market Risk[1]

	2008	2009		2010		2011		2012
	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30
	End of period, EUR million							
Interest rate risk								
Basel ratio for interest rate risk, %[2]	3.9	3.7	3.7	3.9	3.9	3.6	5.0	4.0
Capital requirement for the position risk of interest rate instruments in the trading book	953.3	911.3	780.9	839.8	618.3	643.6	552.1	452.7
Exchange rate risk								
Capital requirement for open foreign exchange positions	110.3	89.1	75.2	83.1	81.1	83.3	72.2	64.5
Equity price risk								
Capital requirement for the position risk of equities in the trading book	186.9	166.3	176.9	183.0	197.1	219.2	185.6	171.7

Source: OeNB.

[1] Based on unconsolidated data. The calculation of capital requirements for market risk combines the standardized approach and internal value-at-risk (VaR) calculations. The latter use previous day's values without taking account of the multiplier. Capital requirements for interest rate instruments and equities are computed by adding up both general and specific position risks. As long as reporting is according to Basel II mutual funds and nonlinear option risks are included in the data according to their risk categories.

[2] Average of the Basel ratio for interest rate risk (loss of present value following a parallel yield curve shift of all currencies by 200 basis points in relation to regulatory capital) weighted by total assets of all Austrian credit institutions excluding banks that operate branches in Austria under freedom of establishment. For banks with a large securities trading book, interest rate instruments of the trading book are not included in the calculation.

Table A22

Liquidity Risk

	2008	2009		2010		2011		2012
	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30
	End of period							
Short-term loans to short-term liabilities	67.0	74.2	72.5	71.2	64.2	69.0	65.9	69.9
Short-term loans and other liquid assets to short-term liabilities	109.0	125.0	124.8	122.9	118.9	122.9	118.1	122.6
Liquid resources of the first degree: 5% quantile of the ratio between available and required liquidity[1]	149.4	143.3	139.9	146.5	145.1	150	152.4	238.6
Liquid resources of the second degree: 5% quantile of the ratio between available and required liquidity[1]	113.5	116.8	110.8	112.4	111.3	114.1	110.9	111.2

Source: OeNB.

[1] Short-term loans and short-term liabilities (up to 3 months against banks and nonbanks). Liquid assets (quoted stocks and bonds, government bonds and eligible collateral, cash and liquidity reserves at apex institutions). The liquidity ratio relates liquid assets to the corresponding liabilities. Article 25 of the Austrian Banking Act defines a minimum ratio of 2.5 % for liquid resources of the first degree (cash ratio) and of 20% for liquid resources of the second degree (quick ratio). The 5% quantile indicates the ratio between available and required liquidity surpassed by 95% of banks on the respective reporting date.

Table A23

Solvency

	2008	2009		2010		2011		2012
	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30
	End of period, eligible capital and tier 1 capital, respectively, as a percentage of risk-weighted assets							
Consolidated capital adequacy ratio	11.0	12.1	12.8	13.3	13.2	13.5	13.6	13.7
Consolidated tier 1 capital ratio	7.7	8.7	9.3	9.8	10.0	10.3	10.3	10.6

Source: OeNB.

Note: Owing to the transition to Basel II, the method of calculation of the capital ratio and the tier 1 capital ratio used from the Financial Stability Report 16 (December 2008) on differs from the method used previously. The denominator of both ratios is given by the sum of all regulatory capital requirements multiplied by the factor 12.5. The numerator of the capital ratio is given by tier 1 and tier 2 capital less deduction items (eligible own funds) plus the part of tier 3 capital not exceeding the capital requirement for position risk. The numerator of the tier 1 capital ratio is given by tier 1 capital less deduction items (eligible tier 1 capital). The sum of all capital requirements consists of the capital requirements for credit risk, position risk, settlement risk, operational risk and the transition to Basel II as well as the other capital requirements.

Table A24

Exposure to CESEE

	2008	2009		2010		2011		2012
	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30
	End of period, EUR billion							
Total assets of subsidiaries[1]	267	257	254	265	264	269	270	281
of which: NMS-2004[2]	*132*	*128*	*127*	*131*	*131*	*133*	*127*	*137*
NMS-2007[3]	*41*	*41*	*40*	*40*	*41*	*42*	*42*	*42*
SEE[4]	*47*	*47*	*49*	*49*	*49*	*51*	*51*	*51*
CIS[5]	*48*	*41*	*38*	*45*	*43*	*43*	*50*	*51*
Exposure according to BIS in total[6]	200	186	204	213	210	225	217	216
of which: NMS-2004[2]	*111*	*103*	*113*	*117*	*116*	*129*	*121*	*124*
NMS-2007[3]	*34*	*34*	*34*	*33*	*34*	*35*	*33*	*33*
SEE[4]	*28*	*27*	*40*	*41*	*39*	*42*	*42*	*38*
CIS[5]	*27*	*22*	*18*	*21*	*20*	*19*	*21*	*21*
Total indirect lending to nonbanks[7]	171	165	160	166	169	171	171	176
of which: NMS-2004[2]	*81*	*81*	*79*	*80*	*82*	*82*	*79*	*84*
NMS-2007[3]	*26*	*25*	*25*	*25*	*26*	*26*	*27*	*26*
SEE[4]	*30*	*31*	*30*	*32*	*32*	*34*	*34*	*34*
CIS[5]	*34*	*28*	*25*	*29*	*29*	*28*	*31*	*32*
Total direct lending[8]	50	51	51	51	49	51	52	53
of which: NMS-2004[2]	*22*	*22*	*22*	*22*	*22*	*23*	*23*	*23*
NMS-2007[3]	*9*	*9*	*10*	*9*	*9*	*8*	*8*	*8*
SEE[4]	*15*	*15*	*15*	*15*	*14*	*15*	*15*	*16*
CIS[5]	*4*	*4*	*4*	*5*	*4*	*4*	*6*	*6*

Source: OeNB.

[1] Excluding Yapi ve Kredi Bankasi (not fully consolidated by parent bank UniCredit Bank Austria).
[2] NMS-2004: Estonia (EE), Latvia (LV), Lithuania (LT), Poland (PL), Slovakia (SK), Slovenia (SI), Czech Republic (CZ), Hungary (HU).
[3] NMS-2007: Bulgaria (BG) and Romania (RO).
[4] Southeastern Europe (SEE): Albania (AL), Bosnia and Herzegovina (BA), Croatia (HR), Kosovo (KO), Montenegro (ME), Macedonia (MK), Serbia (RS), Turkey (TR).
[5] Commonwealth of Independent States (CIS) and Georgia: Armenia (AM), Azerbaijan (AZ), Kazakhstan (KZ), Kyrgyzstan (KG), Moldova (MD), Russia (RU), Tajikistan (TJ), Turkmenistan (TM), Ukraine (UA), Uzbekistan (UZ), Belarus (BY).
[6] Exposure according to BIS includes only domestically controlled banks. As Hypo Alpe Adria was included in the fourth quarter of 2009, comparability with earlier values is limited.
[7] Lending (gross lending including risk provisions) to nonbanks by 69 fully consolidated subsidiaries in CESEE according to supervisory statistics.
[8] Direct lending to CESEE according to monetary statistics.

Note: Due to changes in reporting, the comparability of values as from 2008 with earlier values is limited.

Table A25

Profitability of Austrian Subsidiaries[1] in CESEE

	2009	2010	2011	2012	2008	2009	2010	2011
	1st half				Year			
	End of period, EUR million							
Operating income	6,638	6,585	6,934	6,666	14,102	13,396	13,436	13,608
of which: net interest income	*4,253*	*4,584*	*4,728*	*4,465*	*9,231*	*8,693*	*9,333*	*9,405*
securities and investment earnings	*40*	*34*	*57*	*50*	*103*	*50*	*47*	*67*
fee and commission income	*1,406*	*1,437*	*1,518*	*1,445*	*3,432*	*2,916*	*2,954*	*3,092*
trading income	*785*	*–42*	*371*	*301*	*46*	*1,238*	*368*	*430*
other income	*153*	*572*	*260*	*406*	*1,291*	*498*	*735*	*621*
Operating expenses	3,122	3,177	3,400	3,374	6,961	6,267	6,678	6,808
of which: personnel expenses	*1,401*	*1,400*	*1,480*	*1,485*	*3,200*	*2,739*	*2,870*	*2,991*
other expenses	*1,720*	*1,778*	*1,920*	*1,889*	*3,761*	*3,529*	*3,809*	*3,817*
Operating profit/loss	3,516	3,408	3,535	3,292	7,141	7,129	6,757	6,800
Allocation to provisions and impairments	2,024	1,983	1,592	1,529	2,277	4,829	4,094	4,283
Result after tax	1,190	1,117	1,578	1,356	4,219	1,775	2,073	1,763
Return on assets[2]	0.9%	0.9%	1.2%	1.0%	1.7%	0.7%	0.8%	0.7%
Provisions[3]	3.9%	6.2%	6.8%	8.4%	2.9%	5.3%	6.5%	7.3%

Source: OeNB.

[1] Excluding Yapi ve Kredi Bankasi (not fully consolidated by parent bank UniCredit Bank Austria).
[2] End-of-period result expected for the full year after tax as a percentage of average total assets.
[3] Provisions on loans and receivables in proportion to gross loans to customers.

Note: Due to changes in reporting, the comparability of values as from 2008 with earlier values is limited. Furthermore some positions have been available in detail only since 2008.

Table A26

Market Indicators of Selected Austrian Financial Instruments

	2009		2010		2011		2012	
	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30	Nov. 15
Share prices in % of mid-2005 prices								
Erste Group Bank	49.4	66.4	66.0	91.8	94.8	35.8	39.4	51.9
Raiffeisen Bank International	48.5	75.7	56.9	82.5	70.9	40.3	50.7	58.5
Euro Stoxx – Banken	56.6	70.3	52.7	52.4	53.0	32.8	29.2	33.4
Uniqa	85.1	80.3	85.5	90.2	91.6	57.8	64.4	55.3
Vienna Insurance Group	71.0	81.0	75.2	88.6	90.0	71.7	72.2	75.9
Euro Stoxx – Insurance	62.5	75.0	63.8	71.0	77.4	58.8	60.1	69.9
Relative valuation: price-book value ratio								
Erste Group Bank	0.63	0.80	0.79	1.10	1.34	0.51	0.56	0.74
Raiffeisen Bank International	0.72	1.12	0.84	1.22	0.99	0.56	0.71	0.81
Euro Stoxx – Banks	0.74	0.94	0.66	0.64	0.58	0.36	0.46	0.56
Uniqa	1.48	1.39	1.48	1.58	2.29	1.44	1.61	1.38
Vienna Insurance Group	0.93	1.03	0.95	1.12	1.23	0.98	0.98	1.03
Euro Stoxx – Insurance	0.84	1.03	0.87	0.94	0.93	0.69	0.63	0.75

Source: Thomson Reuters.

Table A27

Key Indicators of Austrian Insurance Companies[1]

	2010		2011		2012	% change year on year
	June 30	Dec. 31	June 30	Dec. 31	June 30	
	End of period, EUR million					
Business and profitability						
Premiums	9,037	16,652	8,935	16,537	8,920	–0.2
Expenses for claims and insurance benefits	5,757	11,882	6,162	12,826	6,474	5.1
Underwriting results	241	373	379	295	345.3	–8.8
Profit from investments	1,589	3,203	1,930	2,964	1,776	–8.0
Profit from ordinary activities	552	1,101	1,028	1,162	914	–11.1
Total assets	102,625	105,099	106,989	105,945	107,824	0.8
Investments						
Total Investments	95,541	98,300	100,094	99,776	101,917	1.8
of which: debt securities	*37,062*	*38,223*	*38,332*	*37,813*	*37,772*	*–1.5*
stocks and other equity securities[2]	*12,621*	*12,559*	*12,988*	*12,363*	*12,249*	*–5.7*
real estate	*5,193*	*5,703*	*5,120*	*5,236*	*5,201*	*1.6*
Investments for unit-linked and index-linked life insurance	14,477	15,325	15,659	15,870	16,944	8.2
Exposure to domestic banks	16,442	15,860	16,890	16,306	17,585	0.4
Claims from reinsurance contracts	1,229	1,229	1,736	1,733	1,990	14.6
Risk capacity (solvency ratio), %	×	356	×	332	×	×

Source: FMA, OeNB.

[1] Semiannual data exclusive of reinsurance transactions, based on quarterly returns.
[2] Contains shares, share certificates (listed and not listed) and all equity instruments held by mutual funds.

Table A28

Assets Held by Austrian Mutual Funds

	2008	2009		2010		2011		2012
	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30
	End of period, EUR million							
Domestic securities	48,777	49,104	48,765	50,587	51,001	51,163	50,046	50,064
of which: debt securities	*14,601*	*16,324*	*16,013*	*16,603*	*15,884*	*15,572*	*16,683*	*17,372*
stocks and other equity securities	*1,473*	*2,144*	*2,863*	*2,813*	*3,696*	*3,630*	*2,991*	*3,126*
Foreign securities	78,655	80,067	89,845	93,102	96,684	93,897	87,458	89,981
of which: debt securities	*57,598*	*57,548*	*61,961*	*63,259*	*61,744*	*60,474*	*58,695*	*59,943*
stocks and other equity securities	*8,899*	*10,064*	*12,663*	*12,870*	*15,540*	*14,918*	*12,097*	*12,355*
Net asset value	127,432	129,171	138,610	143,689	147,684	145,060	137,504	140,046
of which: retail funds	*82,804*	*80,372*	*85,537*	*88,227*	*88,313*	*84,132*	*78,299*	*79,430*
institutional funds	*44,628*	*48,799*	*53,073*	*55,462*	*59,372*	*60,928*	*59,205*	*60,615*
Consolidated net asset value	105,620	107,076	115,337	120,526	123,794	122,398	116,747	120,169
changed by: redemptions and sales[1, 2]	*–7,040*	*–768*	*2,399*	*2,133*	*1,012*	*351*	*–2,117*	*–164*
Distributed earnings[1]	1,965	930	1,767	705	1,696	726	1,495	713
Revaluation adjustments and income[1]	–9,505	3,153	7,629	3,761	3,951	–1,021	–2,039	4,300

Source: OeNB.

[1] The figures concerning the change in the consolidated net asset value are semiannual figures.
[2] Change in the consolidated net asset value of Austrian mutual funds by redemptions and sales (net balance of shares in mutual funds issued and bought back).

Table A29

Structure and Profitability of Austrian Fund Management Companies

	2008	2009		2010		2011		2012
	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30
	End of period, EUR million							
Total assets	504	546	642	639	699	635	661	629
Operating profit[1]	9	45	60	64	78	77	48	59
Net commissions and fees earned[1]	100	124	134	149	154	159	125	141
Administrative expenses[1, 2]	100	88	97	96	103	96	99	100
Number of fund management companies	29	29	30	30	29	29	29	29
Number of reported funds	2,308	2,270	2,182	2,192	2,203	2,205	2,171	2,172

Source: OeNB.

[1] *All figures are semiannual figures.*
[2] *Administrative expenses are calculated as the sum of personnel and material expenses.*

Table A30

Assets Held by Austrian Pension Funds

	2008	2009		2010		2011		2012
	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30
	End of period, EUR million							
Domestic securities	9,705	10,415	11,721	12,482	13,017	13,077	12,576	13,231
of which: debt securities	*142*	*163*	*169*	*163*	*173*	*173*	*140*	*113*
mutual fund shares	*9,543*	*10,228*	*11,520*	*12,296*	*12,818*	*12,878*	*12,420*	*13,087*
other securities	*20*	*24*	*32*	*23*	*26*	*26*	*16*	*31*
Foreign securities	972	1,093	1,124	1,117	1,249	1,270	1,289	1,290
of which: debt securities	*111*	*182*	*138*	*148*	*181*	*159*	*173*	*123*
mutual fund shares	*851*	*879*	*932*	*944*	*1,037*	*1,084*	*1,096*	*1,145*
other securities	*10*	*32*	*54*	*25*	*31*	*27*	*20*	*22*
Deposits	790	664	539	318	422	294	644	698
Loans	154	185	182	153	137	137	137	139
Other assets	332	264	170	176	152	158	152	182
Total assets	11,936	12,621	13,734	14,245	14,976	14,936	14,798	15,541
of which: foreign currency	*312*	*373*	*448*	*424*	*466*	*428*	*416*	*449*

Source: OeNB.

Table A31

Assets Held by Austrian Severance Funds

	2008	2009		2010		2011		2012
	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30
	End of period, EUR million							
Total direct investment	1,062	1,125	884	906	1,004	1,149	1,393	1,405
of which: euro-denominated	*1,043*	*1,103*	*866*	*892*	*985*	*1,125*	*1,363*	*1,377*
foreign currency-denominated	*19*	*22*	*17*	*15*	*19*	*24*	*30*	*28*
accrued income claims from direct investment	*17*	*20*	*15*	*12*	*16*	*15*	*19*	*18*
Total indirect investment	1,076	1,339	1,946	2,278	2,569	2,774	2,891	3,331
of which: total of euro-denominated investment in mutual fund shares	*1,039*	*1,293*	*1,858*	*2,126*	*2,379*	*2,567*	*2,741*	*3,114*
total of foreign currency-denominated investment in mutual fund shares	*38*	*45*	*88*	*152*	*190*	*207*	*151*	*217*
Total assets assigned to investment groups	2,139	2,464	2,830	3,184	3,573	3,923	4,284	4,736

Source: OeNB.

Note: Due to special balance sheet operations total assets assigned to investment groups deviate from the sum of total indirect investments.

Table A32

Transactions and System Disturbances in Payment and Securities Settlement Systems

	2008	2009		2010		2011		2012
	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30
	Number of transactions in thousand, value of transactions in EUR billion							
HOAM.AT								
Number	–	699	676	597	601	539	472	293
Value	4,364	4,535	4,769	4,950	4,497	3,730	3,937	6,944
System disturbances	4	1	4	4	0	1	0	0
Securities settlement systems								
Number	982	801	1,020	1,036	1,034	1,049	1,038	788
Value	247	181	184	230	168	246	193	238
System disturbances	0	0	0	0	0	0	0	1
Retail payment systems								
Number	272,700	272,000	302,100	298,100	318,900	337,100	328,600	328,900
Value	22	22	24	24	25	24	26	27
System disturbances	16	5	14	16	9	2	2	2
Participation in international payment systems								
Number	12,679	17,766	13,356	14,802	16,580	17,080	18,660	19,580
Value	998	676	549	594	570	632	674	723
System disturbances	0	0	0	0	0	0	0	0

Source: OeNB.

Note: The data refer to the six-month period in each case.

Notes

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