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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 pursue 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 three and six 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 2016 should be e-mailed to *eva.gehringer-wasserbauer@oenb.at* by November 1, 2015.

Applicants will be notified of the jury's decision by mid-December. The following round of applications will close on May 1, 2016.

Analyses

Austria: Sluggish economic growth

Martin Schneider[1]

1 Austrian economy grows by 0.3% in second quarter of 2015

According to the first full release of national accounts published on August 28, 2015, the Austrian economy grew by 0.3% in the second quarter of 2015 compared with the previous quarter (in real terms, trend-cycle component adjusted for seasonal and working-day effects). Growth therefore remained unchanged on the flash estimate of July 30, 2015. Marginal upward revisions were made to individual components of the demand side.

Private consumption grew slightly during the second quarter (+0.1%). At the same time, gross fixed capital formation declined (–0.1%), with equipment investment turning slightly positive (+0.5%), however. Construction investment shrank further (–0.5%). Exports of goods and services were revised slightly upward, having risen by 0.2% according to the latest national accounts figures. Restocking contributed positively to GDP growth.

For both the third and fourth quarters of 2015, the results of the OeNB's

Table 1

Quarterly National Account data: results from August 28, 2015

	GDP	Private consumption	Government consumption	Gross fixed captial formation	Exports	Imports	Domestic demand (excluding inventories)	Net exports	Changes in inventories	Statistical discrepancy
	Quarterly and annual changes in % (seasonally adjusted trend-cycle series)						*Contributions to GDP growth in percentage points*			
Q3 14	–0.1	0.0	0.1	–0.5	0.6	–0.3	–0.1	0.5	–0.5	0.0
Q4 14	0.0	0.0	0.2	–0.4	–0.1	–0.2	–0.0	0.1	–0.0	0.0
Q1 15	0.2	0.1	0.3	–0.1	–0.2	0.1	0.1	–0.2	–0.1	0.5
Q2 15	0.3	0.1	0.4	–0.1	0.2	0.0	0.1	0.1	0.2	–0.0
2011	2.7	1.5	0.3	5.3	6.2	6.3	2.0	0.1	0.5	0.1
2012	0.6	0.6	0.1	2.0	1.6	0.9	0.8	0.4	–0.7	0.1
2013	0.4	–0.0	0.4	–0.1	1.0	0.5	0.0	0.3	–0.1	0.2
2014	0.4	0.1	0.8	–0.1	2.1	1.1	0.2	0.6	–0.4	0.1

Source: Austrian Institute for Economic Research (WIFO).

Table 2

Revisions since the Flash Estimate from July 30, 2015

	GDP	Private consumption	Government consumption	Gross fixed captial formation	Exports	Imports	Domestic demand (excluding inventories)	Net exports	Changes in inventories	Statistical discrepancy
	Quarterly and annual changes in % (seasonally adjusted trend-cycle series)						*Contributions to GDP growth in percentage points*			
Q3 14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	–0.0
Q4 14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	–0.0	0.0
Q1 15	0.0	0.0	0.0	0.1	0.1	–0.0	0.0	0.1	–0.1	0.1
Q2 15	0.0	–0.0	0.0	0.1	0.2	–0.0	0.0	0.1	0.2	0.0
2013	0.0	0.0	0.0	0.0	0.0	–0.0	0.0	0.0	–0.0	0.0
2014	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	–0.1	0.1

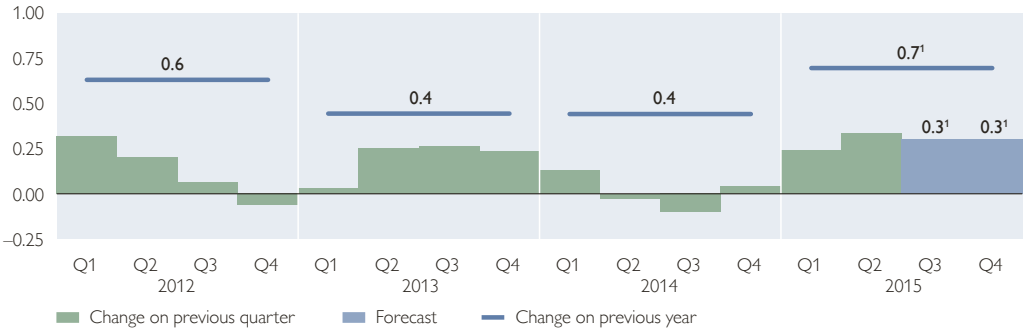
Source: Austrian Institute for Economic Research (WIFO).

[1] *Oesterreichische Nationalbank, Economic Analysis Division, martin.schneider@oenb.at.* *Parts of this contribution are available in German in: OeNB. 2015. Konjunktur aktuell. Berichte und Analysen zur wirtschaftlichen Lage. September 2015.*

Chart 1

Short-term outlook for Austria's real GDP for the third and fourth quarter of 2015

Quarterly and annual changes in % (seasonally and working-day adjusted trend-cycle series)



Source: OeNB's Economic Indicator from August 2015, Eurostat.

¹ Forecast.

Economic Indicator point to real GDP growth of 0.3% (seasonally and working-day adjusted; compared to the previous quarter), respectively. For 2015 as a whole, economic growth comes to 0.7%, thus remaining below 1% for the fourth consecutive year.

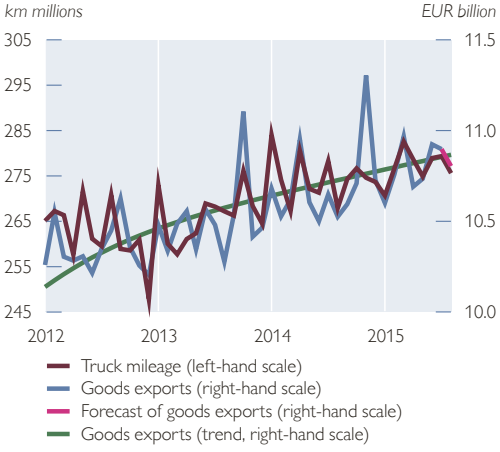
2 Goods exports continue to lack momentum at the beginning of the third quarter

As expected, Austrian goods exports declined in May. This 3.2% decline (in nominal terms, year-on-year) should not be misunderstood as a sign of weak exports, for it is due to the fact that May 2015 had two working days less than May 2014. At more than 10%, the growth of exports to the U.S.A., Croatia, Poland, Spain and Turkey was particularly robust in the first five months of 2015. The most significant declines in export growth were seen in trade with

Chart 2

Exports of goods and truck mileage

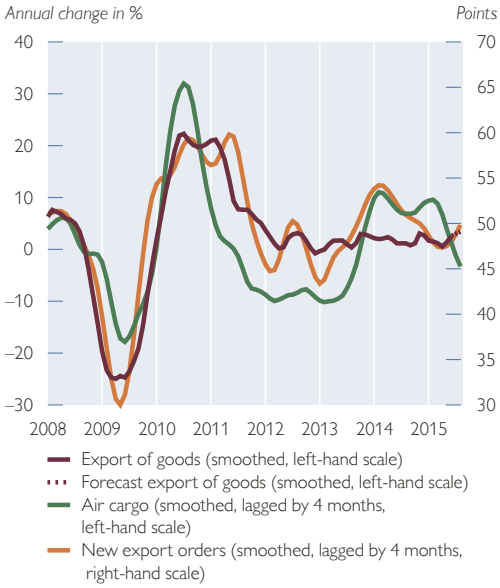
(seasonally and working day adjusted)



Source: ASFINAG, OeNB.

Chart 3

Leading Indicators for External Trade



Source: Statistics Austria, ASFINAG, OeNB.

Russia. In total, nominal goods exports shrank by 0.2% between January and May against the previous year. Broken down by sectors, vehicle exports picked up notably on the previous year, whereas fuel, energy and chemicals exports decreased.

Due to working-day effects, the forecasts for June and July exhibit a volatile pattern, just as the previous months. Export growth is forecasted at 7.9% for June (with 2 more working days than June 2014), and at 1.1% for July (with the same number of working days as July 2014). Seasonally and working-day adjusted, export growth remains positive, but weak. New export orders and the lower external value of the euro foreshadow an acceleration of export growth, which, however, has not occurred yet.

3 Sentiment indicators currently give mixed signals

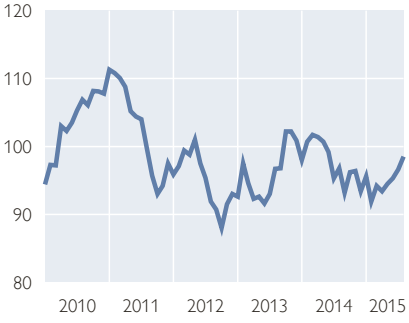
Sentiment indicators currently give mixed signals regarding the business confidence of Austrian companies. The European Commission's economic sentiment indicator went up by a comparatively strong 1.9 points in August, mainly due to a marked improvement in sentiment in the services sector and slight improvements in the retail and construction sectors. Industrial sentiment deteriorated somewhat after a pronounced increase in July. The Bank Austria Purchasing Managers' Index, however, declined by 1.9 points to a reading of 50.5, leaving it only just above the expansion threshold of 50 points. Estimates on new orders and order books have diminished particularly sharply.

Chart 4

Sentiment indicators

Economic Sentiment Indicator

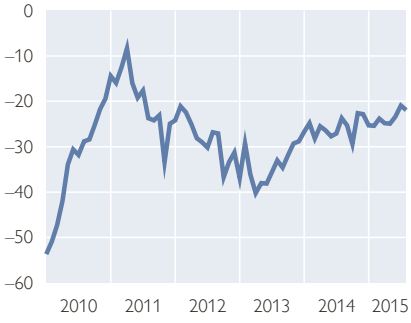
August 2015



Source: European Commission.

Foreign Incoming Orders

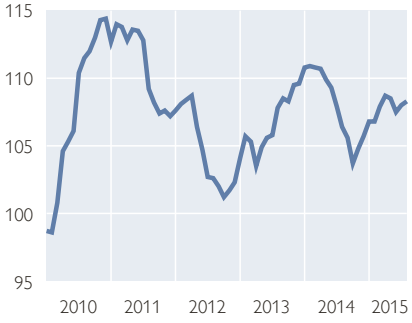
August 2015



Source: European Commission.

IFO Business Climate Index

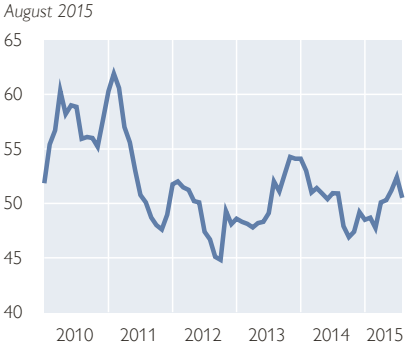
August 2015



Source: IFO.

BA Purchasing Manager Index

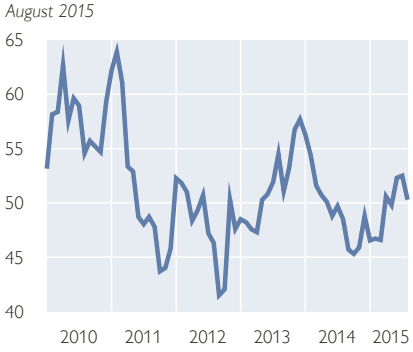
August 2015



Source: Bank Austria.

BA PMI: Incoming Orders

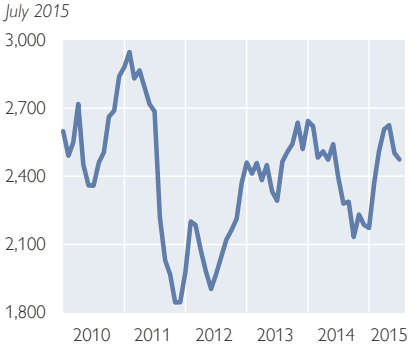
August 2015



Source: Bank Austria.

ATX

July 2015



Source: Vienna Stock Exchange.

4 Labor market still characterized by strong employment growth with simultaneous increase of unemployment

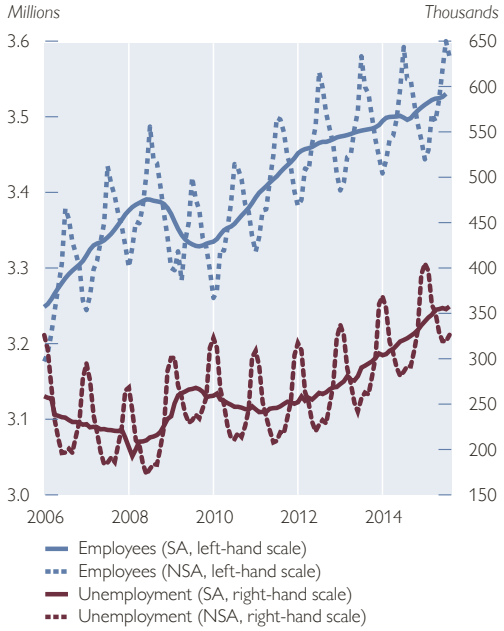
The labor market trends which can be observed since 2011 continued to persist over the previous months. Despite the economy's recent weakness, employment is expanding rather strongly. In August, year-on-year growth reached 0.8%.

Unemployment continued to grow strongly, by 11.9% year on year; compared with the previous months, how-

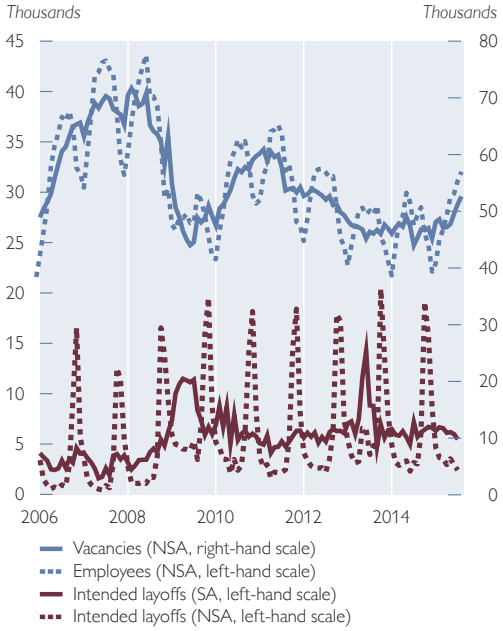
Chart 5

Labor market

Employment and unemployment



Vacancies and number of intended layoffs



Source: AMS, HSV, OeNB (seasonal adjustment).

Note: SA=seasonnaly adjusted; NSA=not seasonally adjusted.

Table 3

Key figures for the Austrian labor market

	Payroll employment		Unemployed persons		Unemployment rate in %			Registered job vacancies	
	Thousands	*Annual change in %*	*Thousands*	*Annual change in %*	*AMS definition (not seasonally adjusted)*	*AMS definition (seasonally adjusted)*	*EU definition (seasonally adjusted)*	*Thousands*	*Annual change in %*
2012	3,465.5	1.3	260.6	5.7	7.0	7.0	4.9	29,422.3	–8.9
2013	3,483.0	0.5	287.2	10.2	7.6	7.6	5.4	26,382.9	–10.3
2014	3,503.4	0.6	319.4	11.2	8.4	8.4	5.6	26,320.1	–0.2
Mar. 15	3,506.3	1.0	360.2	12.9	9.3	9.0	5.6	26,252.0	–3.4
Apr. 15	3,496.3	0.6	352.0	14.5	9.1	9.1	5.8	27,707.0	0.2
May 15	3,524.5	0.7	330.3	13.6	8.6	9.2	6.0	29,502.0	–1.5
June 15	3,563.7	0.7	320.2	13.7	8.2	9.2	5.9	29,865.0	3.0
July 15	3,629.6	1.0	319.9	11.7	8.1	9.2	5.8	31,119.0	16.4
Aug. 15	3,582.0	0.8	327.1	11.9	8.4	×	×	32,033.0	15.7

Source: Eurostat, Association of Social Insurance Providers, Public Employment Service Austria (AMS).

ever, it has not risen. The unemployment rate (national definition) remained at 9.2% (seasonally adjusted) from May to July; the unemployment rate according to the Eurostat definition stands at 6%. The number of reported vacancies, in general a good leading indicator for the labor market, has risen strongly over the past few months but has nevertheless remained considerably lower than in the pre-crisis years or during the upswing of 2011. It would be premature to call these developments a turnaround.

5 Commodity prices pushing up inflation since the beginning of 2015

Austrian HICP inflation went up by 0.6 percentage points from January to July, rising from 0.5% to 1.1%. This is due to the rise in import prices of commodities (energy) and goods, which has affected particularly the energy and manufactured goods sectors.[2] Core inflation (excluding energy and unprocessed food) increased moderately from 1.7% at the beginning of the year to 1.9% in July 2015.

In July, Austrian HICP inflation remained well above the euro area average of 0.2% and also above the 0.1% inflation rate recorded in Germany, Austria's major trading partner. The inflation differential between Austria and Germany averaged 0.7 percentage points in 2015 so far. This discrepancy is owed primarily to divergent price movements in the services sector. This, in turn, is a result of the public sector's contribution to inflation (through administered prices and indirect taxes) as well as unit labor cost developments in the services sector.

Inflation in the energy sector registered negative annual growth rates for 2015 so far. In July, energy prices fell by 6.0%, this was attributable mainly to falling oil prices, which have particularly affected fuel and heating oil.[3] Inflation rates for gas and electricity have declined since the beginning of the year as a result of several energy suppliers cutting their prices. Annual inflation in solid fuel and district heating prices have remained mostly unchanged in the current year so far. The growth of prices of unprocessed food trended moderately upward in recent months, mainly on the back of price increases in meat, fruit and vegetables. By contrast, inflation in processed food prices (including tobacco and alcohol) declined. Particularly dairy products, but also bread and cereals became cheaper.

6 September Inflation Forecast: inflation to rise from 0.9% in 2015 to 1.6% in 2016

The OeNB's September 2015 inflation forecast anticipates an average HICP inflation rate of 0.9% and 1.6% for Austria in 2015 and 2016, respectively. While the inflation forecast for 2015 has remained unaltered compared with the OeNB's June 2015 outlook, the projected inflation rate for 2016 has been revised down by 0.3%. This downward revision is mainly due to lower commodity prices. Because of the sharp rise in the price volatility of commodities for food and energy in the previous quarters, this longer-term forecast is subject to heightened uncertainty.

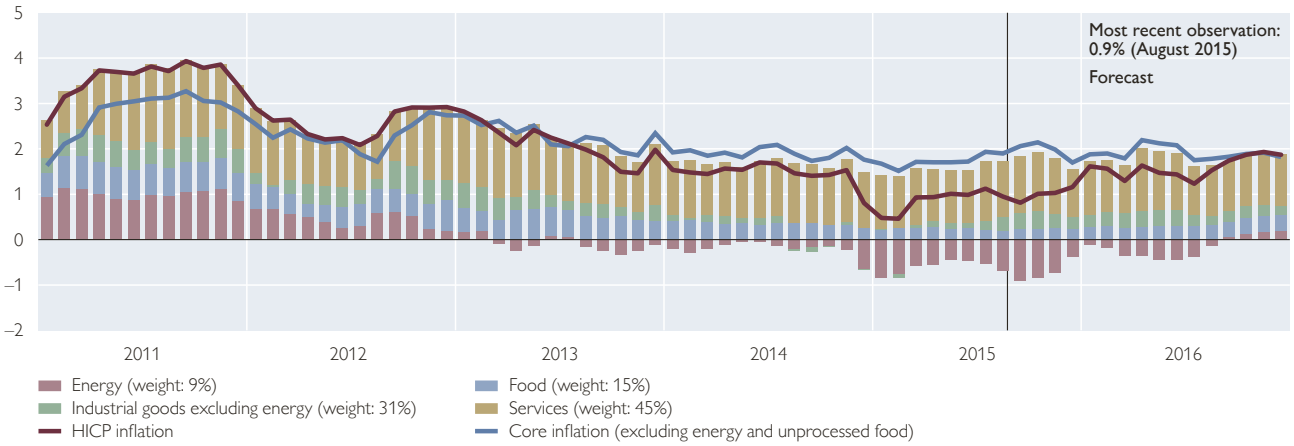
[2] *The price of crude oil has dropped slightly since May as a result of high U.S. crude oil inventory levels and heightened uncertainty regarding China's economic performance. This trend is currently expected to persist until September 2015.*

[3] *The share of fuel and heating oil in the energy sector equals around 55%.*

Chart 6

Austrian HICP inflation and contributions of subcomponents

Annual change in % for HICP and core inflation and contributions to inflation in percentage points



Sources: OeNB, Statistics Austria.

Causes of declining investment activity in Austria

Gerhard Fenz,
Christian Ragacs,
Martin Schneider,
Klaus Vondra,
Walter Waschiczek[1]

Austria's share of investment relative to GDP, which is high by international standards, dipped significantly in recent years. This downtrend, which was also evident in peer economies, chiefly reflected an adjustment process in a climate of weaker long-term growth. While the international trend reversed in mid-2013, Austria's investment share continued to decline. The main reasons for Austrian companies' current reluctance to invest can be traced back to fragile demand and deep uncertainty. Lack of access to finance is unlikely to have dampened investment activity, as the higher level of internal financing has offset the diminishing importance of bank loans. Although there is some evidence of banks tightening their lending conditions, this is unlikely to have led to credit rationing, as demand for bank loans has also fallen off. Estimations based on a structural vector autoregressive (VAR) model also show that loan supply shocks have only had a small negative impact on growth.

JEL classification: E22, E32, E51
Keywords: Austria, investment, business cycle, loan supply, credit crunch

Investments play a vital role in fueling economic growth. Apart from their importance for aggregate demand, they also have a key function in building up a country's capital stock and boosting the economy's future growth potential. Subdued investment activity, as observed in EU countries since the outbreak of the financial and economic crisis, therefore reduces future production capabilities.

Even before the crisis, the level of investment activity differed significantly within the EU. Several peripheral countries experienced a boom in construction investment as the property bubble progressively inflated, especially in Spain and Ireland. By contrast, other countries, including Germany, the Netherlands and Finland, already recorded very weak investment activity before the crisis. The financial and economic crisis caused a persistent fall in investment activity that affected all European economies. As a case in point, between 2007 and 2014, the euro area's aggregate investment share contracted by 3.6 percentage points, to 19.5% of GDP. The only EU countries that managed to more or less sustain their investment shares were Germany (–0.1 percentage points), Belgium (–0.3), Sweden (–0.6) and Austria (–0.6). Investment shares in Cypress, Ireland, Greece, Spain, Romania and the Baltic states, on the other hand, dropped by between 10 and 15 percentage points.

Although investment activity has traditionally been fairly high in Austria over the long run, it has been gradually falling. The overall decline since 1995 of 3.1 percentage points is above the euro area average (–2.0 percentage points), but below that of Germany (–3.4 percentage points). Despite the recent dip in growth, Austria still has one of the highest investment shares in Europe. In 2014, Austria ranked sixth in the EU, with an investment share of 22.1% of GDP. Since the middle of 2013, however, Austria has fallen behind. While investment shares have stabilized in the euro area and in the EU, the share in Austria has continued the downward trend (chart 1, right panel).

Refereed by:
Christoph Schneider,
Austrian Federal Economic Chamber

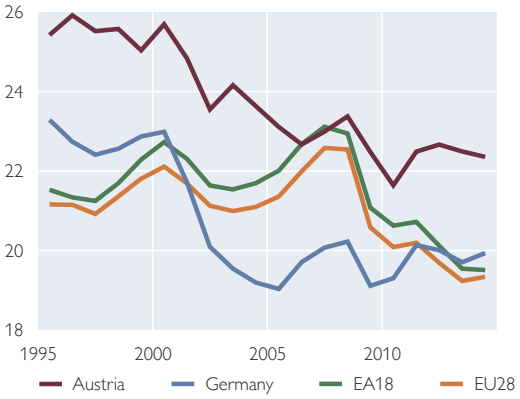
[1] *Oesterreichische Nationalbank, Economic Analysis Division, gerhard.fenz@oenb.at, christian.ragacs@oenb.at, martin.schneider@oenb.at, klaus.vondra@oenb.at, walter.waschiczek@oenb.at.*

Chart 1

International comparison of investment shares

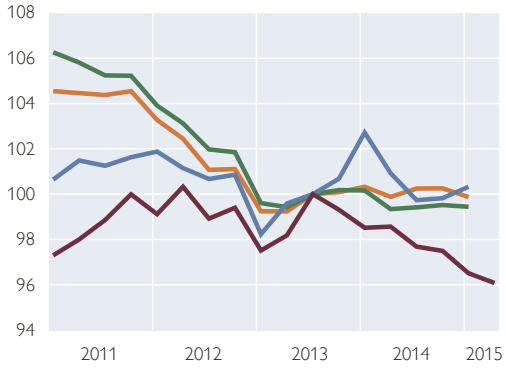
Austria's investment share is high, but declining steadily

% of GDP



Austria's investment share has bucked international trends by declining since mid-2013

Index: Q3 13 = 100



Source: Eurostat.

In this article, we examine the factors behind Austria's recent falloff in investment activity. Section 1 includes a survey of the literature analyzing the determinants of shrinking investment across Europe. The main factors identified are weak aggregate demand and the high degree of uncertainty, while financing only seems to have had a minimal effect. Section 2 presents an analysis of investment trends in Austria. The decline in the investment share since 1995 is mainly attributable to construction investments, but since the middle of 2013, all investment components have played a similar role. In section 3, we examine the traditional determinants of investment activity based on a simple capital accumulation equation and an estimated investment equation. Our results corroborate the findings of empirical studies, namely the dominant influence of demand and financial uncertainty. In section 4, we take a look at the role of financing. This factor does not appear to have dampened investment activity, as the diminishing importance of bank loans has been offset by a higher level of internal financing. Section 5 considers the case for the existence of a credit crunch. Although there is some evidence of banks tightening up their lending conditions, this is unlikely to have led to credit rationing, as demand for bank loans has also fallen off. In section 6, we look at whether credit constraints apply and assess their potential macroeconomic effects on the economy as a whole, using a Bayesian structural vector autoregressive model. Loan supply shocks only appear to have a small negative effect on Austria's GDP growth. In section 7, we summarize the research results and discuss their implications for economic policy.

1 Determinants of weak investment activity in Europe

The sluggish pace of investment in Europe has triggered a wave of empirical studies, which have identified *weak demand* and the high degree of *uncertainty* as the main determinants. *Muted aggregate demand* in the wake of the crisis is the key driver behind declining investment. The traditional accelerator effect explains investment activity as

the need to adapt production capacities to fluctuations in demand.[2] This has been confirmed in all empirical studies (e.g. European Commission, 2013, 2014 and 2015; Barkbu et al., 2015; OECD, 2015). On top of that, weak *demand and profit expectations* have had a dulling effect on investments.

The second central factor identified is the high level of *uncertainty* about future economic performance. In addition to the immediate consequences of the financial and economic crisis, aspects such as escalating public debt and the banking crisis, coupled with concerns about the possible collapse of the euro area, have dented business and consumer confidence. The European Investment Bank (2013) came to the conclusion that insecurity about the future direction of the global economy, coupled with uncertainty regarding the resolution of the European sovereign debt crisis, had been the main causes of the decline in investment since 2009. Besides, fear of a possible credit crunch encouraged companies to build up their cash reserves rather than invest in capital goods.

The fragmentation of Europe's financial markets during the crisis and the resulting *financing constraints* only played a key role in a handful of peripheral European countries. Particularly small and medium-sized enterprises, which are heavily reliant on bank loans, have had to contend with tighter financing conditions (European Investment Bank, 2013). On top of that, the conditions for financing public-sector infrastructure investments have also become more demanding.

The *need to run down debt* in a highly leveraged corporate sector was a particularly urgent priority in Italy, Spain, Portugal and France (Barkbu et al., 2015). In addition, investments in some countries have been held back by *rebalancing requirements* in response to overinvestments and the resulting misallocation of capital.

Real user costs of capital play a key role in neoclassical economics as a central investment determinant. However, empirical studies have identified very little real influence of lower financing costs since the crisis (Banerjee et al., 2015; OECD, 2015).

As well as the traditional factors, the OECD (2015) has found that *product market regulations* have had a negative influence on investment activity. Moreover, *structural shifts* have also reduced investment shares. As a result of the crisis – which hit industry the hardest – the relative importance of services has increased, as they do not generally require such high levels of investment. Even so, these structural shifts have only had a marginal effect of no more than half a percentage point on the investment share (OECD, 2015).

Even when quantifiable factors are taken into consideration, there is still an *unexplained residual investment weakness*. According to Barkbu et al. (2015), for example, the investment share in the euro area is 2 percentage points below the values explained by the determinants. The findings of Baldi et al. (2014) suggest that the investment volume in the euro area during post-crisis years was too low compared with the structural investment share.[3] In the euro area on average, this investment gap was closed in the pre-crisis years. However, this concealed considerable cross-country variations. In Germany,

[2] *An overview of investment theories can be found, for instance, in Oliner et al. (1995) and Eklund (2013).*

[3] *The structural investment share depends on a number of variables, such as GDP, savings ratio, employment rate and indus-try's share in total value added.*

the Netherlands and Finland, investment activity was lower than the structural investment share, but in Greece, Italy, Ireland, Portugal and Spain, it was higher – by quite a significant amount in some cases.

2 Decline in Austria's investment share since mid-2013 across all types of investment

Viewed over the longer term, Austria's investment share has declined more sharply than in the euro area as a whole, but at the same rate as in Germany. An analysis of the contributions made by the different types of investments to this decline (chart 2, left panel) shows that construction investments are the main culprit, contributing 2.2 percentage points less in 2014 than in 1995. Investments in machinery and equipment have also contributed to the shrinking investment share (–1.5 percentage points). Only investments in research and development (R&D) have provided a positive contribution (+2.1 percentage points).[4]

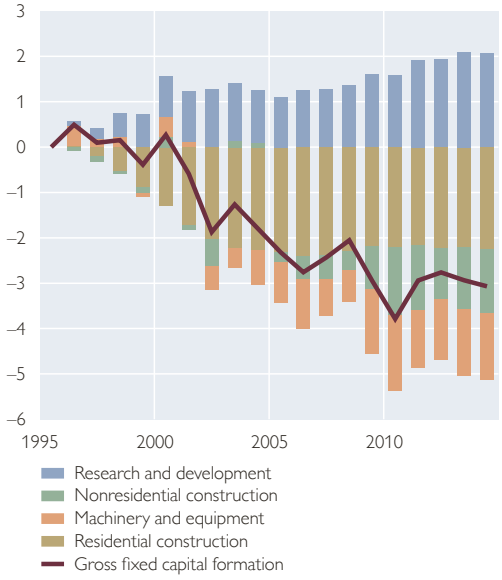
Given that Austria and Germany show similar trends in demographics and property prices, Austria's extremely anemic growth in residential construction investment compared with its neighbor is particularly striking. While investments in residential construction expanded by 24% in Germany between 2009 and 2014, they stagnated in Austria over the same period (+1%). The difference is only half as big in nonresidential construction investment (Austria: –5%, Germany: +7%).

Chart 2

Contributions to the decline in Austria's investment share

Decline since 1995 mainly down to construction investments

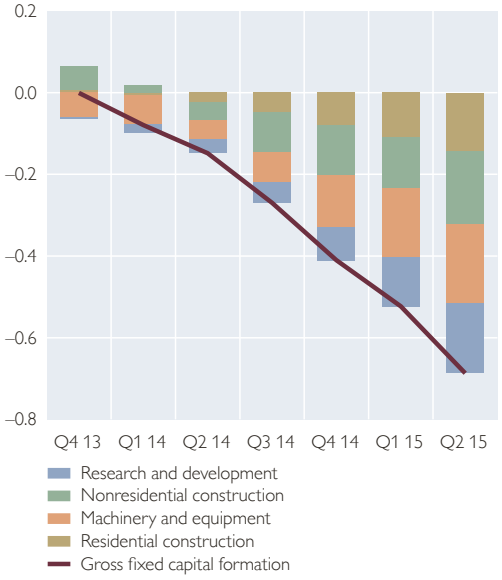
Contributions to change in the investment share since 1995 in percentage points



Source: Eurostat (not seasonally and working day-adjusted data).

Austria's investment share has bucked international trends by declining since mid-2013

Contributions to change in the investment share since Q3 13 in percentage points



Source: Eurostat (seasonally and working day-adjusted data).

[4] *A specific type of investment makes a positive (or negative) contribution to the overall investment share if investments grow more quickly (or slowly) than GDP.*

Table 1

Investment growth in Austria

	2014	Q2 15	Q1 15	Q4 14	Q3 14	2014	2013	2012	2011
	Share in %	*Change on previous period in % (seasonally and working day-adjusted, trend-cycle component)*							
Gross capital formation	100.0	1.5	–0.1	–0.4	–2.5	–1.6	–0.1	–0.9	7.0
Gross fixed capital formation	96.6	–0.2	–0.2	–0.4	–0.5	–0.1	–0.1	2.0	5.3
Residential construction	18.1	–0.4	–0.5	–0.6	–0.7	–1.1	–0.5	–0.5	2.0
Nonresidential construction	26.1	–0.4	0.4	–0.2	–1.1	–0.8	–2.8	4.6	1.9
Machinery and equipment and weapons systems	33.1	0.1	–0.2	–0.4	–0.1	1.3	0.1	1.1	8.3
Transport equipment	9.0	–0.4	–2.9	–4.6	–4.3	–1.5	2.8	–3.4	15.7
ICT equipment	5.7	0.4	1.6	2.9	4.6	6.6	–8.5	4.1	6.9
Other machinery and equipment and weapons systems	18.4	0.3	0.4	0.6	0.7	1.1	1.6	2.4	5.1
Cultivated biological resources	0.2	–0.5	–0.2	0.5	1.8	14.5	3.7	–18.8	–8.7
Intellectual property products	19.2	–0.5	–0.4	–0.3	–0.4	–0.7	3.6	2.5	8.8

Source: WIFO.

Since the middle of 2013 (Q3 13 to Q2 15), Austria's investment share of GDP has contracted by 0.7 percentage points. The decline extends across all types of investment (chart 2, right panel).

Table 1 shows the growth in Austria's investment for the period since 2011 and for the last four quarters up to the second quarter of 2015. While investments in both residential and nonresidential construction fell in 2013 and 2014, the pattern is more varied in the machinery and equipment component. Investments in this category as a whole increased in these two years, but investments in transport equipment contracted in 2014 and the first half of 2015, as did investments in research and development.

3 Traditional determinants of investment activity in Austria: weak demand and uncertainty account for shrinking investment share

In this section, we examine whether traditional determinants identified in empirical studies analyzing the weak investment activity in Europe (section 1) – low aggregate demand and a high level of uncertainty – also apply to Austria. To this end, we use a simple capital accumulation equation to illustrate how the medium-term decline in the investment share can be explained by a falling rate of underlying GDP growth. We subsequently use an estimated investment equation to show that the drop in investment activity in recent years has been influenced mainly by demand trends and confidence factors.

3.1 Lower growth explains the medium-term decline in the investment share

A shrinking investment share is not necessarily symptomatic of a specific investment weakness, but may be caused by a slowing pace of underlying economic growth.

The level of the investment share is determined in the long term by the strength of economic growth and the depreciation rate. This relationship can be derived from a simple capital accumulation equation (see box 1).

Box 1

Calculating the level of the investment share

The level of the steady state investment share (I/Y) can be shown as the relationship between economic growth (g), the depreciation rate (δ) and the capital ratio (K/Y), whereby I stands for investments, Y for GDP and K for capital stock (see Gros, 2014, for example). If the capital ratio is now differentiated by time (t) and a simple capital accumulation equation ($I - \delta K$) is inserted for the change in capital stock, the resulting formula is:

$$\partial\left(\frac{K_t}{Y_t}\right)/\partial t = \frac{\partial K_t}{\partial t}\frac{1}{Y_t} - \frac{\partial Y_t}{\partial t}K_t\frac{1}{Y_t^2} = \left(I_t - \delta K_t\right)\frac{1}{Y_t} - g\frac{K_t}{Y_t}. \qquad (1)$$

The capital ratio is almost a constant value in empirical terms. In Austria, it has been around 3.8 since 1995. According to the perpetual inventory method, the depreciation rate on the real capital stock has also been very stable, only increasing gradually over time. In 1995, 4.1% of the capital stock depreciated in Austria, compared with 4.5% in 2013. Given these assumptions, a decline in the steady-state investment share – where the rate of change in the capital ratio is zero over time – can only be explained by a drop in the rate of steady-state economic growth (g):

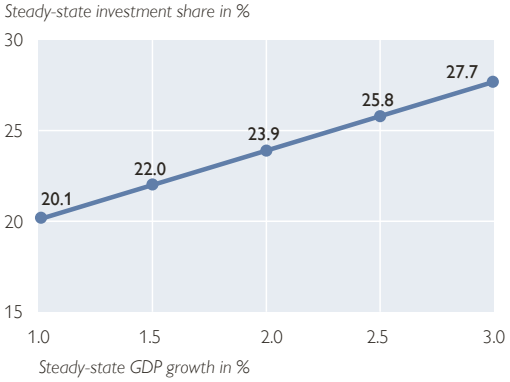
$$\frac{I}{Y} = \left(\delta + g\right)\frac{K}{Y} \qquad (2)$$

It follows that an economy with weak (underlying) growth rates also shows a low steady-state investment share. Given a capital ratio of 3.8, a drop of 1 percentage point in steady-state GDP growth rate causes the steady-state investment share to decline by 3.8 percentage points. Chart 3 (left panel) shows the relation between steady-state investment shares and GDP growth rates, assuming a constant capital ratio of 3.8 and a constant depreciation rate of 4.3%.

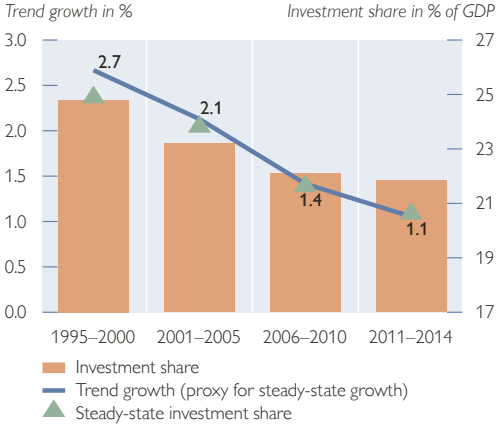
Chart 3

Declining investment share can be explained by weaker steady-state growth

Relation between steady-state investment shares and GDP growth rates



Trend growth and investment share in Austria



Source: Authors' calculations, OeNB.

If the relationship between steady-state investment share, capital ratio, depreciation rate and underlying growth rate is calibrated with the Austrian data (using trend growth as a proxy for steady-state growth), the investment share would show a decline of 4.7 percentage points for the period from 2011 to 2014 compared with the period from 1995 to 2000 (chart 3, right panel).[5] As a matter of fact, the investment share contracted by 3.3 percentage points between these two periods. *The decline in the investment share observable over time in Austria can therefore be explained solely by the fall in underlying economic growth.*

3.2 Traditional determinants and confidence effects explain the investment trends of recent years

In this section, we estimate an investment equation with traditional explanation factors. This equation is part of the OeNB's macroeconomic model (AQM).[6] Gross fixed capital formation *(i)* is partly determined by an adjustment process to the equilibrium capital stock *(k*)*. *k** follows from the cost minimization problem of a representative company using Cobb-Douglas production technology. Other determining factors are real GDP growth *(Δy)*, the real user costs of capital *(ucc^r)* – which are a function of the average corporate interest rate, long-term interest rates as a proxy for bond financing, depreciation, corporate income tax and a risk premium – and a time trend *(T)*:

$$\Delta i_t = -0.21 - 0.06 \cdot \left(\frac{i_{t-1}}{k^*_{t-1}} \right) + 0.77 \cdot \Delta y_t - \\ -0.99 \cdot \Delta ucc^r_t - 0.00026 \cdot T + \varepsilon^i_t \quad (1)$$

In addition to the adjustment to the equilibrium capital stock, gross fixed capital formation is essentially determined by two factors:

- *Accelerator effect:* stronger GDP growth boosts investment activity.
- *Interest-rate effect:* higher interest rates push up financing costs *(ucc^r)* and depress investment activity.

Chart 4 (left panel) shows the contributions to investment growth made by the *traditional determinants* in the investment equation of the AQM for the period from the first quarter of 2010 to the second quarter of 2015. They explain *a large proportion of the investment trend*. The faltering pace of economic growth in recent years is reflected in the modest contributions to growth made by demand (accelerator effect) in the investment equation. The real user costs of capital, which are in turn clearly determined by external financing costs, even rose in 2013 as a result of falling inflation coupled with persistently low nominal interest rates, and had a dampening effect on growth.

The residuals of the investment equation represent the part not explained by the traditional determinants. Since January 2010, the residuals showed longer, persistent deviations during two phases. In 2011, investment activity was stronger than explained by

[5] *Historical trend growth was calculated by using the Hodrick-Prescott (HP) filter.*

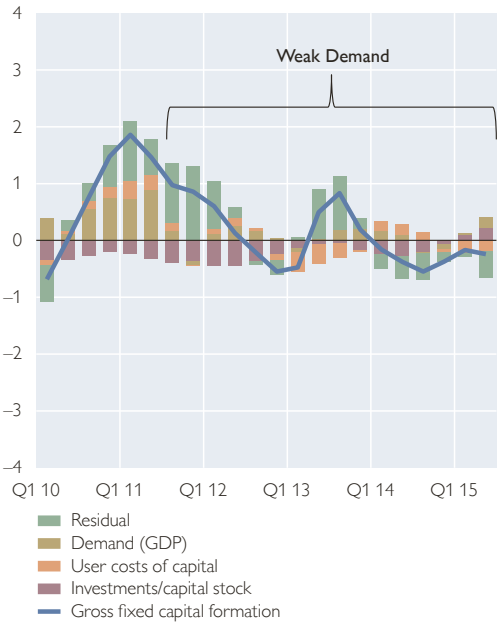
[6] *The Austrian Quarterly Model (AQM) is based on the tradition of neoclassical synthesis: the long-term relationship is dictated by the supply side, but the short-term dynamic mainly by Keynesian factors (rigidities). The central equations of the model – and subsequently the investment equation as well – are estimated empirically by using an error correction approach. For more details, see Fenz and Spitzer (2005) and Schneider and Leibrecht (2006).*

Chart 4

Traditional determinants of investment activity

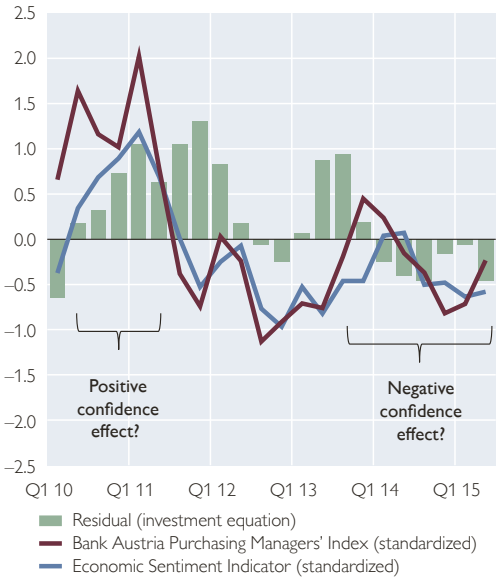
Determinants of investment growth in an estimated investment equation

Quarter-on-quarter change in %; contributions to growth in percentage points



Residuals of the investment equation and confidence indicators

Investment growth (residual) in percentage points and divergence from the mean in standard deviations (indicators)



Source: Authors' calculations, Bank Austria, European Commission.

the determinants, but then weaker during the period since January 2014. An analysis of the development of two important sentiment indicators, the Bank Austria Purchasing Managers' Index and the European Commission's Economic Sentiment Indicator, shows extensive similarities between the sentiment indicators and the unexplained residual of the investment equation (chart 4, right panel). This suggests that confidence shocks supported investment in 2011, but then more recently undermined it. The confidence shock is also one reason, why some GDP-forecasts of the OeNB – and of other institutions – overpredicted GDP-growth in last years.

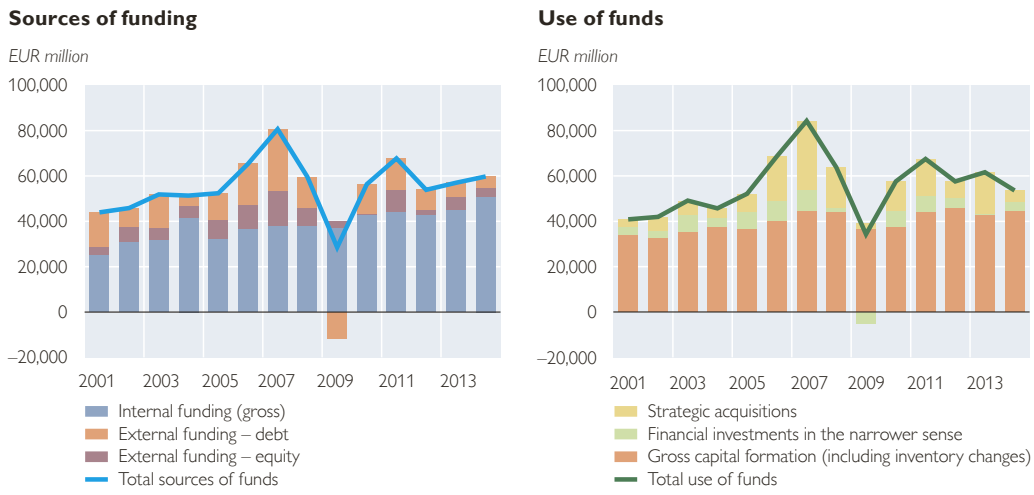
4 Higher level of internal financing offsets diminishing importance of bank loans in Austria

The corporate sector can fund investments either through internal or external financing. Following a sharp drop in 2009 in the wake of the financial crisis, the total financing volume of nonfinancial corporations initially rebounded quickly, but following a brief surge in 2011 remained fairly flat (chart 5, left panel). A look at the components shows that *internal funding*[7] is the most important source of financing for investment activity in the corporate sector. This source is far more stable over time than external funding. Its

[7] *Corporations' internal funding comprises the gross operating surplus and transfers less net property income and income tax and property tax payments. The use of gross internal funding flows (including depreciation) allows for a direct comparison with corporate investments, which also include a depreciation component.*

Chart 5

Use and sources of funds of nonfinancial corporations



Source: OeNB, Statistics Austria.

share in total (internal and external) corporate financing averaged 81% over the period 2009 to 2014. Its relative importance had thus increased significantly compared with the average level of 61% recorded before the crisis (2001–2008). External funding was dominated by external borrowing in recent years (2009–2014: 11% of the total financing volume), while the raising of equity capital only played a comparatively marginal role over the same period (8%).

The right panel of chart 5 (use of funds) shows the structure of firms' overall investment activity, i.e. the total of nominal gross capital formation ("real economic investments") and nominal financial investments. The latter can be divided into strategic acquisitions and financial investments in the narrower sense.[8]

The total volume of real economic and financial investments made from 2012 to 2014 was well below the level of 2011. Financial investments in the narrower sense – which tend to be more volatile – fell sharply, while real economic investments stagnated. The chart therefore provides *no evidence of real economic investments being displaced by financial investments*. On the contrary: the downturn in investment activity has been particularly noticeable in financial investments in recent years.

From 2012 to 2014, *external funding* (debt and equity capital) was well below the level of 2011. The *role of corporate loans* for corporate financing has been *steadily declining for some years now*. Since the crisis, their growth has significantly slowed in nominal terms, and in real terms has even registered a decline (chart 6, left panel). This is also illustrated by the continuous fall in the share of bank loans as a percentage of total assets in the balance sheets of Austrian companies, namely from

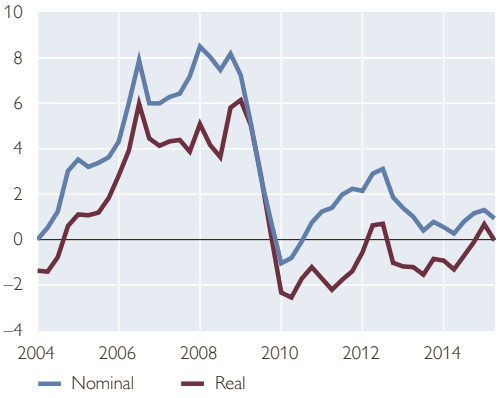
[8] *Here, "strategic equity investments" include all equity securities and credits (domestic and foreign) held by the corporate sector as reported in the financial account. They mainly contain positions which can be considered to be direct investments in other companies (although portfolio investments in listed companies cannot be factored out). "Financial investments in the narrower sense" refers to all other asset items in the financial account.*

Chart 6

Bank loans becoming less important as a source of corporate funding

Growth of corporate loans

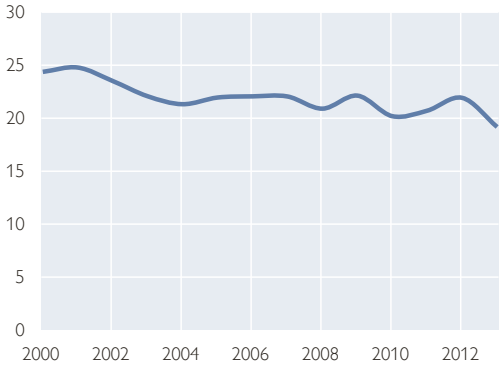
Annual change in %



Source: OeNB.

Bank loans as a percentage of company liabilities

% of total liabilities



Source: BACH database.

24.4% in the year 2000 to 19.2% in 2013 (chart 6, right panel).[9] Summing up funds raised through equity capital and internal financing, own resources accounted for around 90% of the corporate sector's total financial volume during the period 2012 to 2014.

The financial and economic crisis notwithstanding, the ability of companies to finance themselves internally has steadily increased in recent years thanks to an *improvement in net property income* (chart 7).[10] This balance was reduced by 41%, from –EUR 28.7 billion in 2008 to –EUR 17.0 billion in 2014. This achievement was primarily attributable to the *sharp rise in the dividend payments and withdrawals received from shareholdings in other companies,* which registered a 70% nominal increase over the period 2008 to 2014, from EUR 11.5 billion to EUR 19.5 billion. Net interest payments of the corporate sector also made a positive contribution during this period, declining by 36% from EUR 5.0 billion to EUR 3.2 billion. In contrast, the *gross operating surplus* – the excess generated by the company's business activity after deducting labor costs – has still not recovered to its pre-crisis level in real terms. In 2014, the gross operating surplus was 10% below the 2007 level in real terms, reflecting on the one hand the extremely moderate development of gross value added, which recorded an average annual increase of a mere 0.5% in real terms between 2007 and 2014, and on the other hand a comparatively stronger rise in workers' wages (2.0% p.a. in real terms).

[9] *If the deleveraging leads to a reduction in total assets, this is known as a "balance sheet recession" (Koo, 2008). This usually occurs after financial crises when companies and households suffer losses. Such a situation was not evident in Austria, however, as the total assets held on the balance sheets of Austrian companies continued to rise even after the crisis.*

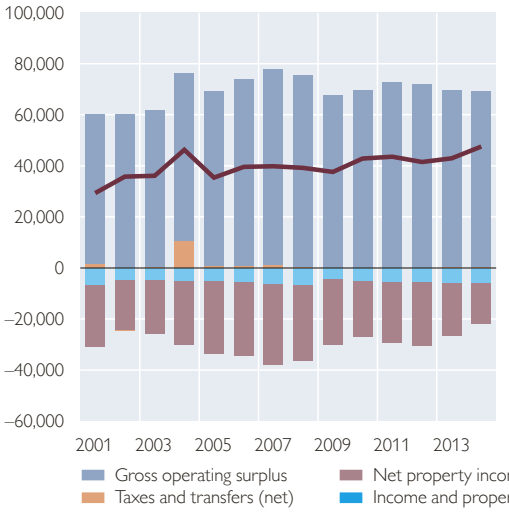
[10] *Net investment income is always deeply negative given the significant net debtor position of nonfinancial corporations.*

Chart 7

Gross internal funding of nonfinancial corporations[1]

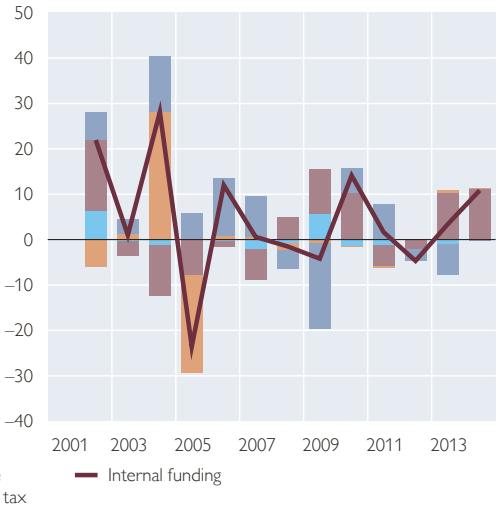
Absolute amounts (in real terms)

EUR million, at 2010 prices



Contributions to growth in internal funding (in real terms)

Annual change; contributions to growth in percentage points



Source: Statistics Austria.

[1] *Including depreciation.*

5 Cautious lending policy by Austrian banks since onset of the crisis

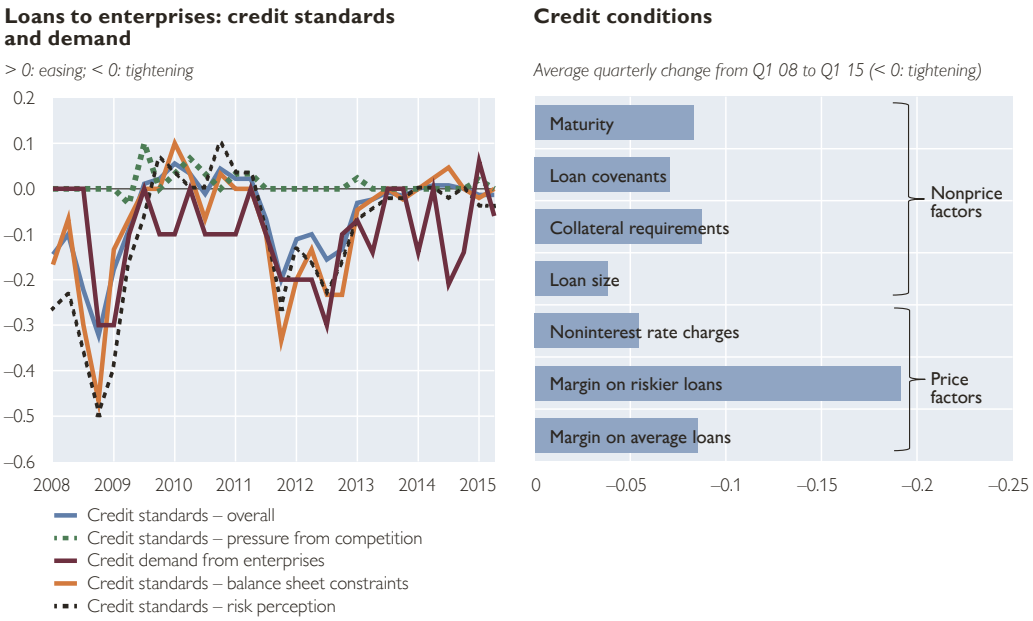
The decline in credit growth since the outbreak of the financial crisis raises the question as to how much this development is attributable to banks tightening their lending policies or whether it is mainly the result of weakening demand. The ongoing discussion of how effectively banks have performed their financing function during the course of the crisis often revolves around the term "credit crunch." However, the definition of this term is not that clear in the academic literature. All the definitions have one point in common: not every decline in lending is understood to be a credit crunch. Owens and Schreft (1995) describe a credit crunch as *a period of sharply increased non-price credit rationing, which may well be connected with the risk of corporate default*. Bernanke and Lown (1991) provide a narrower definition, describing a credit crunch as *a reduction in bank lending that goes beyond a growth-related weakening of credit demand or the deterioration of credit ratings as a result of refinancing constraints*. According to this definition, a decline in borrowing attributable to weaker demand from companies or a poorer credit rating from banks does not constitute a credit crunch.

5.1 Bank Lending Survey reveals a slight tightening of credit standards and weak demand for loans

The Bank Lending Survey conducted by the Eurosystem among selected euro area banks provides some pointers for the existence of a credit crunch. The main findings are reproduced in chart 8. The panel on the left shows the development of credit standards and banks' perception of credit demand trends. Since 2008, banks have *tight-*

Chart 8

Bank Lending Survey results reveal a slight tightening of credit standards and weaker credit demand



Source: OeNB.

ened their credit standards in 16 out of 29 quarters, and only eased them twice. Even though the degree of tightening has been relatively gentle for the most part, it is bound to have had a cumulative effect over the years. At the same time, credit demand from corporations was also flat. Since the outbreak of the crisis, banks have registered a very small *drop in credit demand* in 19 out of 29 quarters.

Chart 8 moreover shows that those factors which can be summarized under "balance sheet constraints" and mainly relate to developments on the liabilities side of banks' balance sheets (equity capital costs, financing conditions on the money or bond markets and also banks' liquidity position) have certainly contributed to a tightening of credit standards in the period from January 2008 to mid-2009 and then again in the second half of 2011 and in 2012. However, factors capturing banks' "risk perception" (expectations regarding general economic activity, industry or firm-specific outlook and the risk on the collateral demanded) made a similar contribution.

A more restrictive lending policy may not only manifest itself in the form of lower loan volumes, but also in a *tightening of credit conditions*. This is highlighted in the right panel of chart 8, which shows that since the beginning of the financial crisis there has been a *significant tightening* of nonprice factors, especially the collateral requirements, the agreements on maturity and the other terms and conditions (loan covenants). This would suggest that according to the narrow definition set forth by Bernanke and Lown (1991), which only refers to volumes but not to higher risk premiums, no credit crunch exists (at least up to now), while the wider delineation applied by Owens and Schreft (1995) would in fact *indicate the existence of a credit crunch.*

5.2 Companies' lower financing needs for fixed investments accounts for flagging credit demand

The Bank Lending Survey also asks banks about the underlying drivers for loan demand from companies. The left panel of chart 9 shows the cumulative change in investment motives since the start of the crisis. Banks attribute the decline in credit demand primarily to companies' smaller financing requirement for fixed investments. In responding to surveys, *enterprises* also report *falling demand for loans*. In the Survey on the access to finance of enterprises (SAFE) carried out every six months by the ECB, for example, Austrian small and medium-sized enterprises (SMEs) reported falling demand for bank loans on balance for eight consecutive periods. As with the Bank Lending Survey, Austrian SMEs cited fixed-asset investments as the most important factor for their lower financing needs (chart 9, right panel).

A further indication of whether financing is a significant problem for the corporate sector as a whole is provided by the question the SAFE survey regularly asks about the most important problem that SMEs face at the time of the survey. Here, less than 10% of Austrian SMEs consistently named access to finance as their major concern. This percentage – typically only about half as high as in the euro area as a whole – has been very stable ever since the survey was first launched back in 2009 (chart 10, left panel). Since 2011, Austrian enterprises have consistently named this factor as their least important concern (previously it had been production costs and labor costs).

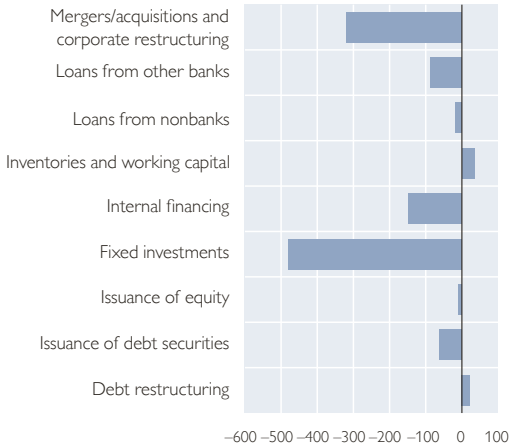
Since 2011, the Austrian Institute of Economic Research (WIFO) has polled Austrian enterprises about their experience of credit terms and conditions at their bank, as part of the WIFO Business Cycle Survey. Here, almost a quarter of the enterprises reported a need for credit during the last quarter

Chart 9

Fixed investments are the main factor behind companies' reduced financing needs

From the perspective of banks

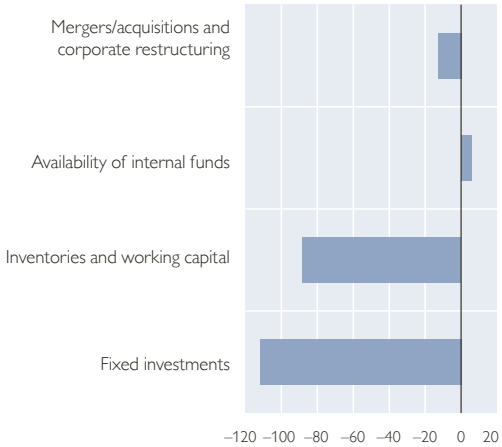
Cumulative diffusion indices from Q3 08 to Q2 15



Source: ECB (Bank Lending Survey).

From the perspective of SMEs

Cumulative balances from H1 09 to H2 13



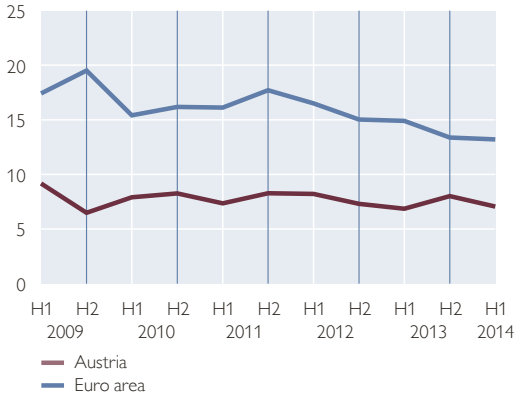
Source: ECB (Survey on the access to finance of enterprises – SAFE).

Chart 10

Company surveys offer no evidence of a financing problem

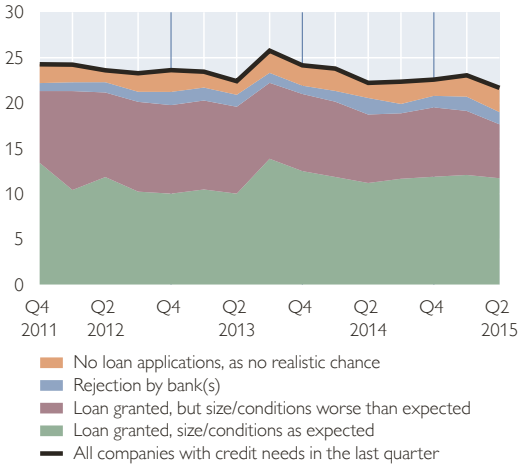
Is access to finance the main concern for your company?

Share in total responses in %



Companies with credit needs in the last quarter

Share in total responses in %



Source: ECB (SAFE), WIFO Business Cycle Survey.

(chart 10, right panel). This percentage came to 21.7% in the second quarter of 2015. Just over half of the companies that need credit receive a loan that meets their expectations both in terms of size and credit conditions. Less than one-third of enterprises are granted a loan that falls short of their expectations in terms of size and/or conditions. This proportion has gradually dropped in recent years. In the second quarter of 2015, 6% of loan applications were rejected. 12% of enterprises with a credit need did not apply for a loan as they saw no realistic chance of their application being approved. The WIFO survey does not therefore provide an indication of tighter credit conditions as far as enterprises are concerned.

5.3 Sectoral analysis provides no indication of credit financing dampening investment activity

Reliance on bank loans varies enormously in the different segments of the manufacturing and services sectors. Data from the Bank for the Accounts of Companies Harmonized (BACH) database show that bank loans on average make up around 19% of the total assets held on companies' balance sheets. Table 2 shows the share of bank loans in the balance sheet of companies, broken down by firm size for the NACE 1-digit codes. The highest share of bank loans is in NACE I (accommodation and food service activities), at 50 % in 2013, and the lowest share in NACE J (information and communication), at 5 %. In terms of scale, there appears to be a clear correlation between the size of a company and the importance of bank loans. The share of bank loans in the balance sheet of small enterprises (sales < EUR 10 million) is 37%, almost three times more than the share of 13% recorded for large companies (sales ≥ EUR 50 million).

These data can be combined with sectoral investment data according to structural company statistics in order to verify whether a credit crunch exists. *A negative correlation between the*

Table 2

Share of bank loans in the balance sheet of companies (broken down by firm size)

	All	Small	Medium	Large
	Share in %			
Total NACE (excluding K642 and M701)(NACE Zc)	19	37	22	13
Agriculture, forestry and fishing (NACE A)	37	39	61	x
Mining and quarrying (NACE B)	16	34	8	11
Manufacturing (NACE C)	13	31	23	9
Electricity, gas, steam and air conditioning supply (NACE D)	7	34	25	5
Water supply, sewerage, waste management and remediation activities (NACE E)	32	40	35	28
Construction (NACE F)	15	30	13	12
Wholesale and retail trade, repair of motor vehicles and motorcycles (NACE G)	19	29	21	16
Transportation and storage (NACE H)	24	39	32	15
Accommodation and food service activities (NACE I)	50	57	33	x
Information and communication (NACE J)	5	19	4	3
Activities of holding companies (NACE K642)	9	x	x	x
Real estate activities (NACE L)	31	42	26	28
Professional, scientific and technical activities (NACE M)	13	x	x	x
Professional, scientific and technical activities (excluding M701) (NACE Mc)	15	21	6	3
Activities of head offices (NACE M701)	13	x	x	x
Management consultancy services (NACE M702)	15	20	11	x
Administrative and support service activities (NACE N)	13	22	21	5
Education (NACE P)	12	15	10	x
Human health and social work activities (NACE Q)	38	44	32	x
Arts, entertainment and recreation (NACE R)	14	21	12	12
Other service activities (NACE S)	22	35	12	27

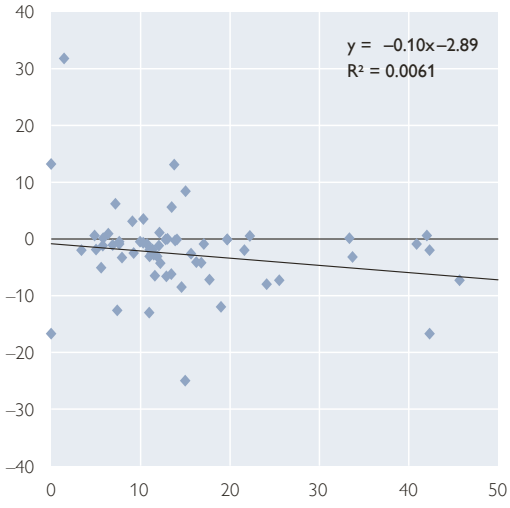
Source: BACH database.

Chart 11

Change in the investment shares with respect to bank loans, broken down by sector

Change in investment share vs. share of bank loans

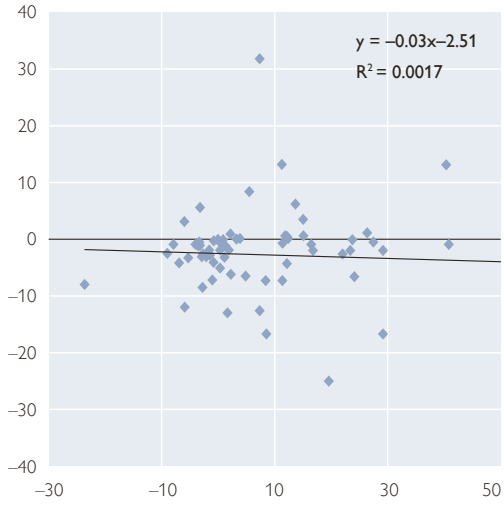
Change in investment share, 2008–2011



Share of bank loans in the balance sheet in 2007

Change in investment share vs. change in share of bank loans

Change in investment share, 2008–2011



Change in the share of bank loans in the balance sheet, 2008–2011

Source: BACH database, Eurostat.

change in the investment share and the share of bank loans would indicate a credit crunch. This is based on the hypothesis that enterprises with a high share of bank loans were potentially more heavily affected by a possible credit squeeze and have therefore scaled back their investments more aggressively during the crisis.

The left panel of (chart 11) plots the change in the sectoral investment shares between 2008 and 2011 compared with the share of bank loans in each sector in 2007. Therefore every point in this chart shows – for a specific sector – the change in the investment share between 2008 and 2011 and the share of bank loans in the balance sheet in 2007. In case of a credit crunch those sectors with a high share of bank loans in the balance sheet should have faced a clear deceleration of the investment share. However, the data show no correlation and therefore there is *no indication for the existence of a credit crunch.* The right panel plots the change in the share of bank loans and the investment share for every single sector. Once again, no correlation is evident.

6 Can loan supply shocks explain business cycle fluctuations in Austria?

The last two sections considered the role of financing in general (section 4) and the importance of banks' lending policy with regard to a potential credit crunch (section 5).

In section 6, we examine whether credit constraints exist and assess their potential effects on the economy at the macro level by using a structural vector autoregressive (VAR) model based on Bayesian principles. Here, the aim is to identify positive (negative) *loan supply shocks* through falling (rising) credit spreads with a simultaneous rise (fall) in credit growth. At the same time, the responses of several other macroeconomic variables, such as GDP growth, inflation and foreign trade conditions, are likewise subject to specific constraints.[11]

The VAR model includes four variables for the domestic and two for the international environment. The Austrian variables include real GDP growth as a measure of the activity level. The GDP deflator serves as a measure for price rises, whereas the volume of lending to nonfinancial corporations and the spread between short-term interest rates (three-month Euribor) and the corporate loan interest rates for describing the loan market.[12] Growth of Austria's export markets (measured by the import demand from Austria's trading partners weighted with foreign trade shares) and development of competitors' prices on Austrian export markets serve as a proxy for the foreign trade environment. The estimation period runs from the first quarter of 2002 to the first quarter of 2015. Growth rates (year-to-year changes) are used for all variables with the exception of credit spreads, which are used in levels.

The VAR model in its reduced form is represented by the following equation:

[11] *The method for identifying shocks follows that of Gambetti and Musso (2012); the econometric estimation is based on Arias et al. (2014) as well as Gali and Gambetti (2015) and allows for the simultaneous use of sign and zero restrictions.*

[12] *Loans to households were not included in the analysis, as they follow a separate cycle in Austria on the one hand due to the high proportion of foreign currency bullet loans and on the other hand because of the major importance of mortgage loans.*

$$\begin{bmatrix} x_t^{AT} \\ x_t^{world} \end{bmatrix} = \begin{bmatrix} A_{11}(L) & A_{12}(L) \\ 0 & A_{21}(L) \end{bmatrix} \begin{bmatrix} x_{t-1}^{AT} \\ x_{t-1}^{world} \end{bmatrix} + \begin{bmatrix} \varepsilon_t^{AT} \\ \varepsilon_t^{world} \end{bmatrix} \quad (2)$$

whereby x_t^{AT}, and x_t^{world} represent the vectors of the endogenous variables for Austria *(AT)* and the international environment *(world)*. The matrices *A* contain the coefficients on the endogenous variables, and *(L)* stands for the lag operator. The coefficients of the domestic on the foreign variables were restricted to zero. ε_t^{AT} and ε_t^{world} represent the residuals produced by the estimation. Both the estimation of the model and the identification of structural shocks are described in detail in the annex.

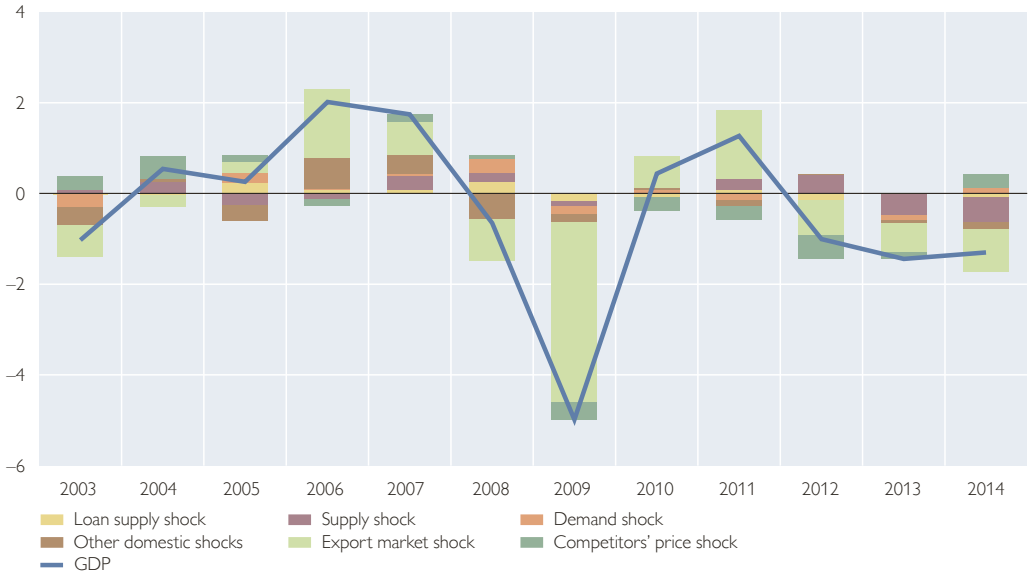
The historical breakdown of Austria's GDP growth into domestic and international shocks allows for drawing conclusions about the importance of loan supply shocks for the period 2003 to 2014. The results are illustrated in chart 12 and show that *business cycle fluctuations in Austria's economic cycle (measured by mean-adjusted GDP growth) can mostly be explained by the international environment*. This finding is not particularly surprising for a small, open economy like Austria, but is further amplified by the high global synchronicity of economic cycles in the wake of the financial and economic crisis. *Domestic shocks play a comparatively subordinate role*.

Loan supply shocks did not make a significant contribution to GDP growth in any of the years during the period 2003 to 2014, but their impact should not be overlooked entirely: on average, they contributed around 0.1 percentage points every year. In the pre-crisis years, their contribution to GDP growth had always been positive or close to zero. Although their contribution turned negative in 2009 following the outbreak of the financial crisis, it remained remarkably low given the strength of the downturn and the financial market turmoil. This may have been due to companies' increased use of existing credit lines during the crisis years in order to safeguard their cash

Chart 12

Loan supply shocks only make a small contribution to GDP growth

Real GDP growth in %, growth contribution in percentage points



Source: Authors' calculations, OeNB.

Table 3

Variance decomposition of the forecast error for Austrian GDP growth

	1 quarter	4 quarters	8 quarters	20 quarters
	Share in total variance in %			
Domestic shocks				
Loan supply shock	3.2	3.4	3.1	3.0
Demand shock	23.8	18.5	16.7	16.1
Supply shock	15.6	12.3	11.1	10.6
Other domestic shocks	13.6	7.0	6.3	6.2
International shocks				
Export market shock	43.7	56.6	54.5	55.1
Competitors' price shock	0.0	2.3	8.2	9.0
Total	100.0	100.0	100.0	100.0

Source: Authors' calculations.

flows, which could have resulted in an overestimation of the loans actually used for investment purposes.

During the last three years (2012 to 2014), the contribution made by loan supply shocks to GDP growth was negative, at –0.1 percentage points on average. Since loan supply shocks primarily affect growth through corporate investment activity, and investments make up just over one-fifth of total economic output, supply-side constraints on the credit markets in recent years are likely to have dampened investment growth by up to half a percentage point every year.

The issue of the relative importance of individual structural shocks for business fluctuations in Austria can be analyzed with the help of a forecast error variance decomposition. This makes it possible to identify what percentage of the variance of the forecast error for a specific forecast horizon can be attributed to the shock in question.

The results of the variance decomposition in table 3 show that the two international shocks together account for between 44% (with a forecast horizon of one quarter) and 64% (with 20 quarters). Among the domestic shocks, the loan supply shock has by far the weakest explanatory power. Only 3% of the fluctuations in economic growth can be attributed to loan supply constraints.

To summarize, loan supply shocks have been found to have only had a marginal impact on Austrian GDP growth since 2003. *While loan supply shocks had made a very small positive contribution to Austria's economic growth before the outbreak of the crisis, they have had a negative impact of around 0.1 percentage points every year since then.* As a result, credit constraints are only likely to be a modest drag on the level of investment activity in the economy as a whole at present.

7 Summary and conclusions

Answering the question as to whether Austria suffers from a *specific investment weakness* requires a differentiated view. Although its investment share has fallen sharply in the last twenty years, Austria still comes in sixth place in the EU rankings. The decline in the investment share since 1995 is mainly attributable to construction investments, but since the middle of 2013 *all investment components have played a similar role.* Nevertheless, the decline in investment shares seems to reflect the economic fundamentals:

– Using a *long-term* oriented simple capital accumulation model, we

show that the decline in investment shares observed over the last two decades can be explained by the decreasing trend growth rate of the Austrian economy.

– Standard *short- to medium-term* oriented investment models, such as the accelerator model, also explain the investment trend over the past years extremely well.

Only when it comes to the *most recent quarters* since the first quarter of 2014 the accelerator model highlights an inexplicably low rate of investment growth that could in part be attributable to the recent dip in confidence in Austria, contrary to international trends.

An analysis of other determinants of investment (access to finance, credit constraints) also does not find strong evidence for a specific and strong investment weakness:

– An analysis of the *access to finance* does not provide any evidence of a dampening effect on investments. The entire financing volume of the corporate sector was certainly relatively low and showed very little dynamic over the past three years, but there were significant structural shifts. External financing through companies taking out loans and raising equity declined, while internal financing rose due to higher dividend payouts and lower interest payments (equivalent to higher cash flows, all else being equal).

– *Credit constraints are likely to have had only a marginally negative effect on investment growth.* A number of indicators support this assumption: while surveys confirm that banks have tightened their lending conditions, at the same time corporate demand for loans has been weak, with less demand for fixed investments cited as the main reason. As a result, the cautious lending policy of banks for financing business investments is unlikely to have been much of a constraint on investment volumes given the very low demand for credit, even though the tighter credit standards – such as stricter collateral requirements or higher margins – have undoubtedly been an additional challenge for enterprises. An analysis at the *sector level* shows that the decline in investment activity in the wake of the crisis occurred irrespective of the importance of bank loans for the sector in question. Estimations using a *structural vector autoregressive model* show that loan supply shocks had a dampening effect on GDP growth of just 0.1 percentage points per year in the period from 2012 to 2014.

In conclusion, despite the mentioned *recent dip in confidence,* no *specific structural investment weakness* can be identified in Austria. Given the *moribund economic environment characterized by a high level of uncertainty and low growth expectations,* the behaviour of corporations has actually been quite rational: Investments are low due to weak economic conditions and still dampened growth expectations. Investment activity will only pick up in Austria once the *expectations* improve for companies' sales. This does not rule out possibilities for economic policy measures, which are not in the focus of this paper. They could aim at the business cycle itself as well as on long term conditions. Traditional anticyclical policy measures (aiming at standard short-term multiplicator effects as described in equation 1 in this paper) could foster investment in the short term. Policy measures could also focus at improving long-term growth prospects (e.g. aiming at R&D and human capital following the traditional literature on economic growth).

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Annex: estimation and identification of the structural BVAR model

As it is impossible to identify the structural model purely through the reduced form, appropriate constraints have to be imposed. In the identification scheme adopted in the current analysis, constraints derived from economic theory are overlaid on the impulse response functions. For the international environment, a Cholesky decomposition is used to approximate the supply and demand shock, whereby the variables are included in the following order: export markets and competitors' prices. As assumed, the Austrian variables do not have any influence on developments in the global economy. The Austrian block comprises four variables: GDP, GDP deflator, loans to nonfinancial corporations and the credit spread between corporate lending rates and short-term interest rates. Besides a supply and demand shock, also a loan supply shock is identified. A fourth shock is a residual that cannot be determined economically. Algebraic sign constraints are applied when identifying the Austrian shocks: with a positive supply shock, GDP increases while prices decline. No assumptions are made for the response of loans and credit spreads. All four variables (GDP, prices, loans and credit spread) must rise in the case of a positive demand shock. A positive loan supply shock is determined by a rise in GDP, prices and loans coupled with a parallel decline in credit spreads. The idea underlying the system used to identify the loan supply shock is as follows (see Gambetti and Musso, 2012): in the case of a positive loan supply shock, banks will increase their loan supply either directly or indirectly by offering more favorable lending conditions. Both a rise in lending volume and a decline in credit spreads will thus be observable. The improved loan supply should have a positive impact on consumption and investment and boost GDP. Prices rise in response to demand. All the sign and zero constraints are shown in table A1.

The estimation uses the method of Gambetti and Musso (2012) and Arias et al. (2014). The authors employ a time-variable VAR model with stochastic volatility which is estimated using Bayesian principles. It allows for theoretically motivated sign constraints and zero restrictions (as used in the Cholesky decomposition).

Table A1

Identification of structural shocks

	Reaction of model variables to the shocks					
	GDP	Prices	Loans	Spreads	Competitors' prices	Export markets
Domestic shocks						
Loan supply shock	1	1	1	–1	0	0
Demand shock	1	1	1	1	0	0
Supply shock	1	–1	?	?	0	0
Other domestic shocks	?	?	?	0	0	0
International shocks						
Export market shock	?	?	?	?	?	1
Competitors' price shock	?	?	?	?	1	0

Source: Authors' compilation.

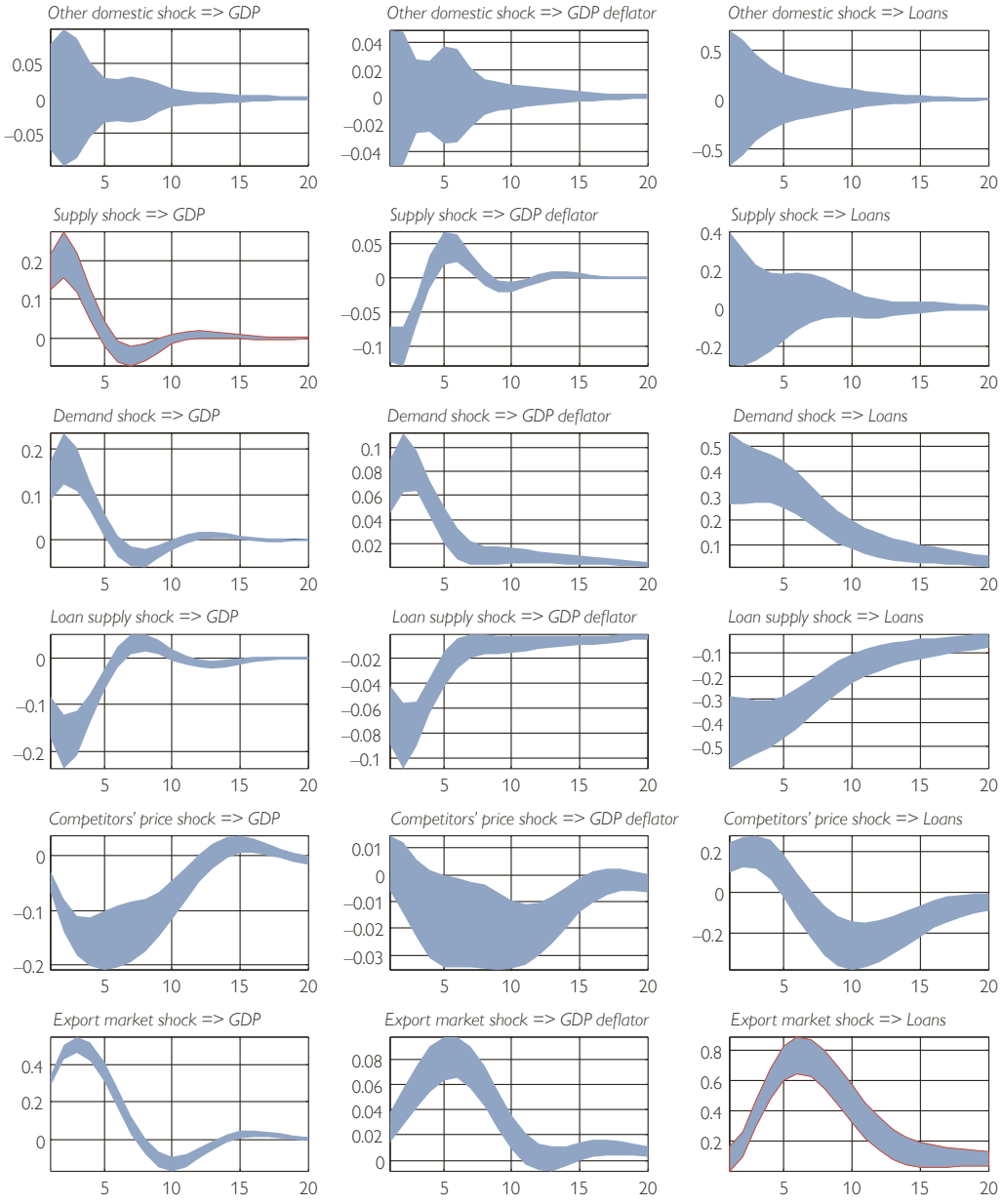
Note: ? = not restricted.

The results of the BVAR model for the impulse response functions are illustrated in chart 13. They show the responses of the model variables to the six identified structural shocks. The bands displayed in chart 13 signal the 16% and 84% threshold of the selected 5,000 valid rotations.

The two international shocks – export market and competitors' price shock – behave like a typical shock in global demand or supply. The domestic shocks follow the assumed algebraic sign constraints. The identified negative loan supply shock is characterized by a drop of 0.15% in GDP in the first year, a 0.07% decline in prices, and a 0.46% fall in loans to nonfinancial corporations. At the same time, the spread between corporate loan rates and short-term interest rates widens by 10 basis points.

Chart 13

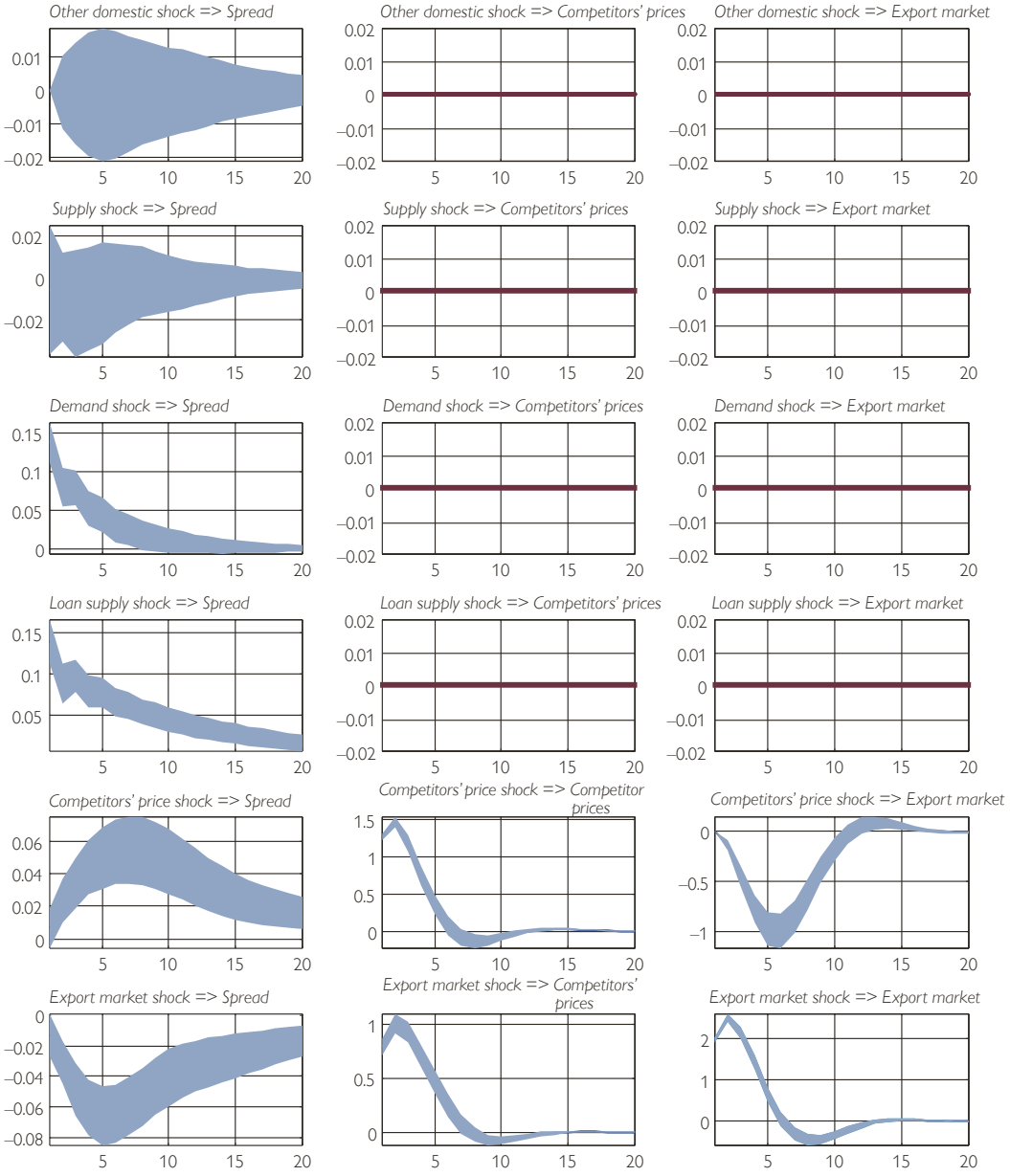
Impulse response functions: reaction of model variables to structural shocks



Source: Authors' calculations.

Chart 13 continued

Impulse response functions: reaction of model variables to structural shocks



Source: Authors' calculations.

Expected retirement age and pension benefits in Austria: evidence from survey data

Markus Knell,
Esther Segalla,
Andrea Weber[1]

In this paper we present evidence on Austrians' expectations about their retirement age and the size of their pension benefits. We find that young people expect to retire at an older age compared to the actual age. The answers indicate that this increase in the expected retirement age might be sufficient to counterbalance the forecasted rise in life expectancy over the next decades. Furthermore, the increase is also approximately in line with the assumptions that underlie official forecasts about the development of pension expenditures. People in Austria also expect to receive less pension benefits, i.e. they expect net replacement rates to decrease, although in this case our results are less conclusive. In general, there exists a considerable degree of uncertainty, in particular among younger people. Furthermore, we find that the main structure of the new pension account system does not seem to be well understood. This suggests that the rules of the new system could be better communicated (e.g. via individualized pension account information).

JEL classification: J1, J26, H55, D84
Keywords: pension system, retirement age, replacement rate, subjective expectations

The average Austrian worker retires before reaching the age of 60. In international comparisons this stands out as one of the lowest retirement ages and it is regarded as a major challenge for the Austrian pension system. In recognition of this fact, the pension reform of 2003/04 included a number of measures that directly aimed at increasing the effective retirement age. First, various pathways into early retirement were restricted or closed, e.g. early retirement on the grounds of long insurance records (referred to as "Hacklerregelung" in Austria). Second, the statutory retirement age for women was scheduled to increase between 2024 and 2034 from the age of 60 to 65 (in half-year steps). Third and foremost, the reforms established a new pension account system that completely reshaped the old defined benefit model. The new system is based on transparent accounts, lifelong assessment periods, higher deductions for early retirement and higher supplements for later retirement and a higher degree of actuarial fairness (see section 2).

The importance of the retirement age issue is also reflected in the current political agenda. The work program of the current federal government includes a plan to increase the effective retirement age from 58.4 (2012) to 60.1 years (2018). The success of this program is assessed by semi-annual monitoring and until February 29, 2016, the government will decide whether it has to take further measures in order to reach the goal of increasing the effective retirement age.

Despite the economic importance and the political prominence of this issue, it is at the moment difficult to evaluate whether the legislated reform measures will be sufficient to increase the effective retirement age. The main reason for this difficulty lies in the fact that many of the reform steps will yield their full benefits only in the future. This is not only true for the increase in the female statutory retirement age but also for the introduction of the pension account system that affects only the cohorts born after 1955.

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Refereed by:
Maarten van Rooij,
De Nederlandsche Bank

There exist three possible strategies to assess the likely impact of the reform measures on future retirement behavior: the use of structural models, the analysis of the experience of other countries which have implemented similar programs and the examination of survey evidence. Each of these approaches has strengths and weaknesses and they should be regarded as complementary methods. In this article we take the latter route, analyzing the results of a survey that was conducted at the beginning of 2014. Survey evidence has been regularly used for other countries in order to elicit information about people's expectations, plans and preferences. To the best of our knowledge, this is the first study that applies this approach to the case of Austria.[2] The survey includes questions about respondents' expectations concerning their retirement age and their pension benefits and also about their knowledge of the pension system. The latter element is interesting since during 2013 (i.e. right before the survey was conducted) many insured persons from the cohorts 1958 to 1990 had received a letter from the pension insurance agency (Pensionsversicherungsanstalt – PVA) in which the new pension account system was described and individuals were asked to provide information about contributory and noncontributory periods (for education, childcare, employment abroad etc.). We use this "treatment" (and other questions about individuals' state of knowledge) in order to investigate whether people who are better informed also have different perceptions of the system and different expectations.

We are interested in four main questions. First, and most importantly, at what age do respondents expect to retire, and do younger people expect to retire at an older age? Second, how high do people think their future pensions will be? Third, how high is people's uncertainty about these issues? Fourth, are they aware of the new pension account system and do they understand the main rules?

Our findings can be summarized as follows. First, we find that younger people expect to retire at later ages. In particular, the expected retirement age increases from 62 (age group 50–59) to 64 (age group 20–29). A similar increase can be detected using alternative measures of the expected retirement age (e.g. respondent's partner's or the younger generation's retirement age). This increase would suffice to counterbalance the forecasted increase in life expectancy over the next decades. Furthermore, back-of-the-envelope calculations suggest that the subjective retirement expectations are in line with (and maybe even somewhat higher than) the assumptions concerning the increase of the effective retirement age that underlie official forecasts about future pension expenditures. Second, younger respondents expect lower (net) replacement rates than older or already retired respondents (around 70% for

[2] *One of the first articles using subjective expectations about pension benefits and retirement is Bernheim (1989). Other studies (using U.S. data) include Chan and Stevens (2004), Benítez-Silva and Dwyer (2005) and Dominitz and Manski (2006). The related literature has also used data from Germany (Coppola and Wilke, 2014), the Netherlands (de Grip et al., 2013) and Italy (Brugiavini, 1999; Botazzi et al., 2006).*

the age group 50–59 and 67% for the 20–29 cohorts). Third, the answers indicate that respondents show a considerable degree of subjective uncertainty about both their expected retirement age and their replacement rates. This uncertainty is particularly high among the younger generations. Fourth, better information does not seem to have a large effect on expected behavior and perceptions (with the exception of the expected retirement age). Fifth, people's knowledge about the main features and the rules of the new pension account system is limited. We present evidence that people do not fully grasp the importance of the length of the contribution period for the pension level and that they therefore underestimate the size of deductions for early retirement (an average of 3.5% instead of approximately 7%). We conclude by stressing the importance of clear and easily comprehensible communication about the new system in order to reduce uncertainty, increase acceptance and facilitate the desired behavioral responses.

This paper is structured as follows: Section 1 briefly describes the new Austrian pension account system. In section 2 and 3 we introduce the survey we used and analyze respondents' expectations about retirement age and net replacement rates. Section 4 studies the extent of uncertainty, section 5 the influence of better information on people's expectations and section 6 concludes.

1 The new Austrian pension account system

The pension reform of 2003–04 has reorganized the Austrian pay-as-you-go (PAYG) pension system into a system that is based on individual accounts. A detailed description of the main features of the system can be found in Knell (2013), OECD (2013) and BMF (2014). In this section we are going to present the main elements of the new system that are important to understand and interpret the answers to the survey.

The centerpiece of the harmonized pension system is an individual defined benefit pension account specified in the General Pensions Act (Allgemeines Pensionsgesetz, APG). The target benefit level is expressed by the formula "45–65–80": after 45 years of insurance and retirement at the age of 65, the system provides an initial pension that corresponds to 80% of average lifetime labor income. This target is implemented by means of an accrual rate ("Kontoprozentsatz"). Every year 1.78% of total earnings (up to a ceiling) are credited to the account while past credits are revalued by the growth rate of the average contribution basis which gives 80% (=45x1.78%) after 45 years of contributions (or – to be precise – insurance). For early or late retirement (which in any case requires a minimum number of years of insurance) within an age corridor between 62 and 68 there are annual deductions and supplements: –5.1% for each year of early retirement and +4.2% for late retirement. This can be expressed in the formula for the first pension payment received by individual i:

$$P_i = \kappa \bar{Y} D_i \left(1 - \lambda_i \left(65 - R_i\right)\right), \qquad (1)$$

where κ=0.0178 is the accrual rate, $\bar{Y}$ is the average lifetime pensionable labor income, D_i is the number of contribution (or insurance) years, R_i is the retirement age and λ_i is the annual deduction (supplement) for early (late) retirement ($\lambda_i = 0.051$ for $R_i < 65$ and $\lambda_i = 0.042$ for R_i). The gross replacement rate (to which the figure 80% of the formula 45–65–80 refers) is thus given by the

ratio of the first pension P_i to lifetime income $\bar{Y}$.[3]

Existing pensions are (typically) adjusted for the rate of inflation. In order to speed up the transition period from the old to the new pension account system it was decided in 2012 that all pension entitlements acquired in the old system will be transformed into an "initial credit" at the beginning of 2014.

2 Expectations about retirement age

In order to gain information about Austrians' knowledge, expectations and preferences with regard to the pension system we conducted a survey among 2,000 individuals in early 2014. Details of the survey are described in box 1.

2.1 Expectations about own retirement age

All respondents who indicated to be in the labor force were asked the following question: "At what age do you realistically expect to enter into retirement?" The answers to this question result in an average expected retirement age of 63.1 for all individuals aged between 20 and 59 (see table A1 in the annex). This is considerably higher than the current effective retirement age of 59 (including invalidity pensions) or 61 (old-age pensions only).

What is more interesting than the plain average, however, is to see whether we can expect an actual increase in the retirement age over the next decades. In chart 1 we plot the relationship between respondents' biological age (at the time of the survey in 2014) and their expected retirement age. The graph shows a clear downward trend. Younger cohorts expect to retire later than older working cohorts. The slope of the fitted line is –0.075, which implies that an age difference of 13 years between two birth cohorts is associated with a difference in retirement expectations of one year.[4]

In order to control for other influences on retirement expectations we used a regression analysis. In particular, we regressed the answer to the question about the expected retirement age on a number of standard sociodemographic characteristics. In the annex we present the full table with the results of all variables while in table 1 we only report the coefficients for a subset of explanatory variables. Looking at column (1) it turns out that the negative correlation between age and expected retirement that is visible in chart 1 remains highly significant even if one

Chart 1

Retirement expectations by age

Source: Own calculations based on an OeNB survey (2014).

[3] *This is important to keep in mind to interpret respondents' answers to the question about a replacement rate that differs from this concept in two dimensions. First, it was related to the expected first pension relative to current labor income (instead of average lifetime income) and second, we asked about the net instead of the gross replacement rate. In the case of increasing wage profiles one would thus assume that – ceteris paribus – the expected net replacement rate is decreasing with individual age.*

[4] *If we look – for the sake of comparison – only at the retirees in our sample we get a mean actual retirement age of 57.2 which is about in line with historical data. However, this result cannot be directly compared to the data on past average retirement ages due to a survivorship bias.*

Box 1

Survey on retirement expectations

The survey on retirement expectations used in this study was conducted via personal interviews of approximately 2,000 respondents older than 15 years between February and March 2014. Respondents were asked a number of questions related to the pension system and their retirement expectations, including questions concerning their knowledge about the system, their labor market history, their retirement expectations, their assessment of the system and their political preferences. In addition we also asked about the likely retirement behavior of respondents' partners, about their subjective life expectancy and about their subjective health status.

Due to the design of the survey the answers include information both about working and retired individuals. In total, the survey covers about 1,250 respondents between the ages of 20 and 59 who indicated to be in the labor force in 2014; 1,100 of this group answered our central question about their expected retirement age. On the other hand, the survey included 528 retired respondents, almost all of which (509) provided the age at which they entered into retirement. In this paper we use the answers of the retirees only for the results shown in column (3) of table 2 and for a couple of comparisons between the survey data and the official data. Summary statistics of our main variables can be found in table A1 in the annex.

controls for a large number of covariates. The size of the coefficient is –0.065, which is slightly lower than in the univariate relation illustrated in chart 1.[5] Although the effect is not huge, it at least indicates that the retirement age is likely to increase over the next decades. In order to analyze the causes for this expected increase and to determine the role of pension reforms and the accompanying public debate one would have to compare the expected retirement ages before and after the start of the pension reform process. The lack of available panel data, however, prevents us from pursuing this line of investigation and we can only speculate about the reasons that underlie the age pattern. First, it is likely to be related to the transition from the old to the new pension system. In particular, for older cohorts the expected pension benefits will be determined to a higher degree by the old pension rules (captured by the initial credit). Under the old system, which was typically more generous than the new system, an aspired replacement rate could be achieved with a lower retirement age. Second, younger cohorts might expect further pension reforms in the future that will require them to work even longer in order to achieve the aspired replacement rates. Third, the public debate about the pension reform might have a particularly strong effect on younger cohorts that have become more pessimistic about the level of their expected public pension which is reflected in their higher expected retirement ages.

One way to put the expected increase in the retirement age into perspective is to compare it to the forecasted increase in life expectancy. Using the data provided in BMF (2014), life expectancy at the age of 65 is expected to increase until 2060 by about 0.1 per year. Approximating the current relation of pension years to work years as 1/3 (i.e. assuming that the average person works from the age of 20 to the age of 60 and dies at the age of 80), the average retirement age has to

[5] *The use of age^2 does not lead to significant results, which confirms the use of a linear model.*

Table 1

Expected retirement age

	(1)	(2)	(3)	(4)
	Benchmark	No income	Male	Female
Dependent variable	*Exp. ret. age*	*Exp. ret. age*	*Exp. ret. age*	*Exp. ret. age*
Age	–0.065***	–0.061***	–0.068***	–0.069***
Male	2.25***	2.74***	–	–
Unemployed	1.57**	0.20	1.71*	1.57
Employed in public sector	–0.49	–0.47*	–1.05**	0.32
Bad subjective health	–1.71***	–0.82**	–2.40***	–0.90
University education	0.38	1.14**	0.26	0.53
Income	2.03***	–	2.79***	1.97
Income^2	–0.25**	–	–0.35**	–0.52
Constant	63.10***	64.55***	64.50***	63.72***
Adjusted R^2	0.26	0.22	0.16	0.12
N	770	1,095	373	397

Source: Authors' calculations based on an OeNB survey (2014).

*Note: The table reports OLS estimates using population weights. ***, **, * denote significance at the 0.01, 0.05 and 0.10 level, respectively. The dependent variable is expected retirement age. Only a subset of variables is shown. The full set of variables is reported in table A2 in the annex. For reasons of readability the income variable has been divided by 1,000.*

increase by 0.1x2/3=0.067 per year in order to hold this ratio constant at 1/3. This is almost exactly the size of the increase suggested by our regression analysis based on individuals' expectations.

Looking at the other variables in column (1), we see that men expect to retire more than two years later than female respondents. We will come back to this issue in section 2.4. On the other hand, unemployed people expect to retire later while people that assess their health as mediocre or bad expect to retire almost two years earlier. The impact of income is also strong. The numbers in column (1) imply that a move from the first to the ninth decile increases the retirement expectation by two years. This may have to do with different preferences, with different employment opportunities and also with the fact that due to the income ceiling on pension contributions, high-income earners will ceteris paribus achieve lower replacement rates, which they might try to compensate for by a longer working life. On the other hand, many people decline to give information about their income and the inclusion of this variable implies a loss of observations. In column (2) we therefore present the results of a regression that leaves out this variable. The results remain qualitatively unchanged, although there are some changes in the size of the effects. Furthermore, now the completion of a university degree works as a substitute for missing income information and indicates an increase in retirement expectations.

It is interesting to compare our results to the findings for other countries, both concerning the plain average and the existence of a possible time trend. As far as the first dimension is concerned, we would have to look at comparable surveys from a similar point in time in order to make meaningful comparisons. Since these are not easily available we will leave this issue aside.[6]

[6] *In table 4 we report, however, that the average expected retirement age for an Italian survey conducted in 2007 is 64.3 which is higher than the Austrian value (compare. also the findings in Botazzi et al., 2006).*

As far as the time trend is concerned there exist a number of studies that have looked into the effect of an increase in the statutory retirement age (SRA) or the early retirement age on retirement expectations. Coppola und Wilke (2014) show for Germany that the increase in the SRA from 65 to 67 (adopted in 2007) has increased retirement expectations for men by almost two years (but a high degree of individual heterogeneity can be observed). De Grip et al. (2013) conducted a similar analysis of a Dutch pension reform implemented in 2010 that increased the SRA in two steps from 65 to 67. This increased the expected retirement age of the affected cohorts by 3.6 months and 10.8 months, respectively. Botazzi et al. (2006) have found that as a result of the Italian pension reform package adopted in the 1990s the expected retirement age increased by two years for men and by three years for women.[7]

The Austrian pension reform also included an increase in the SRA for women. We will discuss this topic below and show that there does not seem to be a measurable effect on expectations. On the other hand, we want to note that neither in Coppola und Wilke (2014) nor in de Grip et al. (2013) the authors found a significant effect of the age on the expected retirement age besides the impact of the increase in the SRA. In this respect the reaction in the case of Austria presents an interesting and slightly unusual pattern, where the increase in the expected retirement age seems to be a prolonged, continuous and across-the-board process.

2.2 Expected development of the average retirement age from 2015 to 2055

From a policy perspective it is interesting to translate the age pattern of individual expected retirement ages into a forecast of the average retirement age for the upcoming decades. This pattern can then be compared to the official forecasts that underline the studies and recommendations of the Austrian Pension Commission (2014) or the Ageing Report of the European Commission (2015).

At first sight this seems like a straightforward thing to do. In particular, the expected year of retirement RY_i for an individual i is given by the formula $RY_i = 2014 + R_i - Age_i$, where R_i is his or her expected retirement age. A person aged 44 in 2014 who indicates to retire at the age of 60 will thus expect to retire in the year 2030 while the same is also true for an individual aged 49 that expects to retire at the age of 65. One can calculate RY_i for each respondent in our survey and then take the average of R_i for each year in order to come up with a sequence of annual expected average retirement ages. We show the resulting pattern in chart 2 (blue line), where we contrast it with the official assumptions concerning the effective retirement age that have been published by the Austrian Pension Commission (2014, table 28b).

We observe that the survey data imply a faster increase in the effective average retirement age than assumed in the official report, where it is expected to increase only from 59.2 (in 2015) to 61.4 (in 2050).

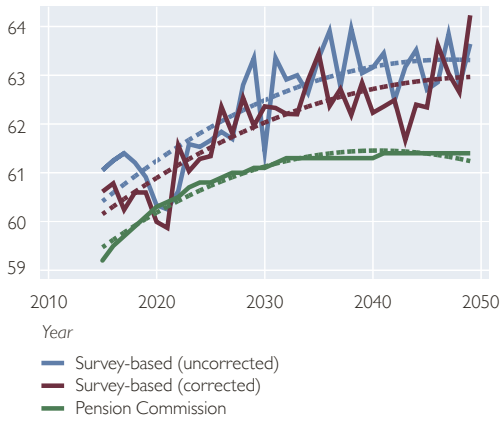
We want to emphasize, however, that our calculations should only be regarded as rough estimates that are sub-

[7] *These studies about the effect of changes in the SRA on retirement expectations can be contrasted to articles that look at the effect of such policies on actual retirement behavior, e.g. Mastrobuoni (2009).*

Chart 2

Effective retirement age

Averege effective retirement age



Source: Own calculations based on Pension Commission (2014) and an OeNB survey (2014).

Note: The dashed lines shows polynominal fits.

ject to a number of serious caveats. First, our calculations are based only on a very limited number of observations (between 25 to 30 for each year). In order to reduce the degree of uncertainty about the estimates one would have to considerably increase the size of the survey. Second, we implicitly assume that the size of each cohort is identical while in reality there may be changes over time that will have an impact on average retirement ages. For the Austrian situation, however, this may not be overly important since the official forecasts assume an almost constant population in the age group 15–64 (see Pension Commission, 2014, table 11). Third, the survey answers only measure individuals' retirement expectations and it is not self-evident how to interpret these answers. In particular, we do not know whether respondents expect the current pension system to remain unchanged or whether they expect further pension reforms, which may contribute to the age pattern of the results (while such expectations of future policy changes are absent from the official forecasts). Furthermore, it is unclear whether individuals' stated expectations refer to their first-best plans or whether they also account for the possibility that they might be forced to deviate from their preferred choices; either because they have to leave the labor market early (e.g. for health reasons) or because they decide to prolong their working career (e.g. in order to counteract bad income shocks).[8]

There are a number of responses to these potential objections. First, the existing literature provides solid evidence that subjective expectations about various variables are good predictors of actual behavior (Dominitz, 1998; Hurd and McGarry, 2002). This is also true for subjective expectations about the retirement age (Chan and Stevens, 2004) even though it has been argued that in this case the answers reflect modes rather than means (Bernheim, 1989). Second, our survey also asked respondents whether they believe that "in the next few years there will be further drastic pension reforms." If we split the sample according to the answers to this question we get an even larger age coefficient for the subsample that does not expect further reforms (–0.13 vs. –0.06). Third, we also try to account for the possibility that individuals neglect the occurrence of "bad life events" (e.g. chronic health problems). Twelve respondents in our survey indicate, e.g., that they expect to retire at the age of 75 and two expect to do so at the age of 80. Even if we took their stated intentions at face value we would have to consider the nonnegligible probability that they will not be able to follow through with their plans.

[8] *In some countries there also exist differences between the time of permanent labor force exit and the collection of pension benefits. In Austria, however, these two events typically coincide.*

We have made a simple correction in order to account for this possibility.[9] The resulting time series for this corrected average retirement age is also shown in chart 2 (red line).

Although the correction reduces the estimated average effective retirement age by about half a year, it still suggests that it might increase to 63 by the year 2050. As said above, this estimation should be taken with a grain of salt since it is based on many strong assumptions. On the other hand, the assumptions of the Pension Commission might be overly cautious, in particular since they seem not to take fully into account the effects of the pension reform measures.[10]

2.3 Expectations about other people's retirement ages

In this section we want to investigate whether our findings about the increase in expected retirement are robust. We do so by looking at additional pieces of information. On the one hand, the Household Finance and Consumption Survey (HFCS) also included a question about the expected retirement age in Austria. If we use these data from 2010 we get an age coefficient of –0.089, which is broadly in line with our own result. On the other hand, our survey also included two questions asking respondents for their estimation of other people's retirement age: their own partner's and (in the case of retirees) that of people that are 30 years younger than they are themselves. In each case, about 500 individuals answered the question. The (unconditional) means for the expected retirement age of 20–59 year olds are 62.7 years (for partners) and 65.9 years (for people who are 30 years younger) while the comparable number for respondents' own expected retirement age is 63.1. Respondents' expectations for themselves and their partners are therefore pretty much aligned. On the other hand, retired respondents expect a retirement age for the younger cohorts that is not only much higher (about 6 years) than their own retirement age but also higher than the retirement age that the younger cohorts expect for themselves.

We have performed a regression analysis with age, gender and regional dummies as the only independent variables (for the main reason that we do not have any other information about partners or the hypothetical juniors).

Table 2

Comparison of different retirement expectations

	(1)	(2)	(3)
	Own	Partner	30 years younger
Dependent variable	*Exp. ret. age*	*Exp. ret. age*	*Exp. ret. age*
Age	–0.070***	–0.030*	–0.063***
Age difference	–	–0.015	–
Male	2.84***	–3.13***	0.45
Constant	64.68***	65.95***	69.89***
Adjusted R^2	0.19	0.24	0.05
N	1,104	548	467

Source: Authors' calculations based on an OeNB survey (2014).

*Note: The table reports OLS estimates using population weights.***, **, * denote significance at the 0.01, 0.05 and 0.10 level, respectively. The dependent variable is the respondent's own expected retirement age (col. (1)), the retirement age of the respondent's partner (col. (2)) and the retirement age of a hypothetical person 30 years younger than the respondent (col. (3)). The regressions also contain regional dummies. "Age difference" is defined as the difference between the respondent's and the respondent's partner's age. The negative sign of "Male" in col. (2) reflects the fact that the partner is of the opposite sex.*

[9] *The correction involves the following steps: We assume that all labor market exits before the age of 50 are involuntary and due to "bad health shocks." These exogenous exit rates are extrapolated to the age of 80 by assuming a proportional relation to mortality rates. We then calculate for each individual a "corrected retirement expectation" as a probability-weighted average between their planned retirement age and the retirement age that would be expected if they had to leave earlier than at the planned date. Finally, we repeat the same steps that we conducted for the uncorrected measure in order to derive the curve shown in chart 2.*

[10] *Interestingly, in the projection of the BMF (2014) that was prepared for the European Commission's Ageing Report 2015, the assumptions show a more pronounced increase in the effective retirement age until 2050 (see table 4 in BMF, 2014): up to 64.2 for men and 63.2 for women (although starting from higher ages in 2014).*

As can be seen in table 2, the impact of age on expected retirement is consistently negative in all three specifications, although it is smaller in size for the retirement behavior of partners. In this case we have also added the difference between respondents' own age and their partners' age as an explanatory variable. The effect of this variable, however, is not significant. Interestingly, when considering the retirement age of juniors, gender does not seem to play a role.

2.4 Gender differences

As stated above, the statutory retirement age in Austria is currently 60 for women and 65 for men. The gender gap in effective retirement ages, however, is only around two and a half years. In the years before the survey (2013/14), e.g., the average retirement age for old-age pensions had been 63 for men and 59.5 for women while the corresponding figures for the overall retirement age (including invalidity pensions) had been 60.2 and 58, respectively. The size of this gender gap in the effective retirement age is rather large by international comparisons.

Looking at table 1 it stands out that this gender gap is still present in the expected retirement age, and even its size seems almost unchanged (between 2.2 and 2.8 years). This is surprising since it means that even the increase in the statutory retirement age for women to be phased in between 2024 and 2034 (i.e. for women that were between 46 and 50 years old at the time of our survey) did not increase the expected retirement age. This is also visible in the age categories. In particular, the average expected retirement age for the youngest age group (20–29) is 65.3 for men and 62.8 for women, which gives again a gap of 2.5 years.[11]

We have also run the benchmark regression separately for men and women. As one can see in columns (3) and (4) of table 1, there are some differences concerning the explanatory variables. In particular, income level and health status are not statistically significant in the regressions that only include female respondents.

The persistent gender gap in retirement age of around 2.5 years in Austria is much larger than in comparable countries, both concerning actual and expected retirement behavior. As far as the latter is concerned, the gender gap is estimated to be around 0.6 years in Germany (Coppola und Wilke, 2014), around 0.33 in the Netherlands (de Grip et al., 2013) and around 1 in Italy (Baldini et al., 2015). Possible explanations for the gap are a lack of information, strong persistence in behavior, the influence of social norms and the presence of spousal effects. The expected persistence of the gap also suggests that the public debate about the pension reforms may have caused young people to be particularly pessimistic about the adequacy of the pension system without them being aware about all the details of the new system. These issues are an interesting topic for further research.

3 Expectations about the replacement rate

Our survey also asked respondents to state their expectations about the size of pension benefits. In particular, we asked them about their assessment of the net replacement rate (i.e. the size of their net pension benefits compared to

[11] *The official labor market projections that underline the data published in the Ageing Report of the European Commission assume a faster closing of the gap, with a forecast value of only 1 for the years from 2040 to 2060 (see table 4 in BMF, 2014).*

their current net income). We did not pose this question directly but rather asked respondents a series of three questions that allowed us to also estimate the degree of people's uncertainty about their expected net replacement rate. Details about the procedure can be found in box 2. Furthermore, as already mentioned in section 1, the replacement rate concept of the survey differs from the target rate of 80% from the basic formula 45–65–80, which refers to the gross replacement rate and the size of the first pension payment relative to the lifetime *average* labor income (instead of current income).

The average expected net replacement rate for all respondents between the age of 20 and 59 is 68% (see table 3). There is a rather high degree of variation between individuals with a standard deviation (SD) of 12.6% and 10% of respondents expect the value to be below 52%, while another 10% expect it to be above 82%. Interestingly, the actual average net replacement rate of the retirees in our survey is almost identical to these expectations, amounting to a mean of 68.5% and a SD of 12.2%.

Chart 3 plots the expected net replacement rate against the age of respondents. There exists a positive relation indicating that younger cohorts expect a lower net replacement rate. The relation, however, does not seem to be very strong and somewhat erratic. To look more closely at the determinants of the expected net replacement rate we have again performed a regression analysis. As shown in table 3 we find that men expect a net replacement rate that is significantly lower (between 2%–3%) than that of women. The same is true for unemployed persons although the effect is only marginally significant. Finally, in line with chart 3, we find that younger people expect a lower net replacement rate. The impact is, however, rather moderate and for each 10 years of age difference the expected net replacement rate is between 1% and 1.5% lower.[12] For other countries such an age pattern was not found for expected pension benefits (Dominitz and Manski, 2006).

In column (2) of table 3 we again leave out the income variable in order to increase the number of available observations. The results stay qualitatively unchanged while the coefficient on age increases. In column (3) we add the expected retirement age $\bar{R}$ (in case a respondent has provided answers concerning R_{min} and R_{max}) that has been used as the reference age in the question on

Table 3

Expected net replacement rate

	(1)	(2)	(3)
	Benchmark	No income	Exp. ret. age
Dependent variable	*Exp. NRR.*	*Exp. NRR.*	*Exp. NRR.*
Age	0.090*	0.157***	0.102*
Male	–3.14***	–2.11**	–1.43
Unemployed	–3.90	–4.19*	–3.83
Income	–0.24		–0.81
Income^2	0.33		0.64
Expected ret. age			–0.41*
Constant	63.81***	62.21***	89.67***
Adjusted R^2	0.08	0.07	0.10
N	667	850	535

Source: Authors' calculations based on an OeNB survey (2014).

*Note: The table reports OLS estimates using population weights. ***, **, * denote significance at the 0.01, 0.05 and 0.10 level, respectively. The dependent variable is the expected net replacement rate. Only a subset of variables is shown here. The full set of variables is reported in table A3 in the annex.*

[12] *The coefficient in table 3 is, however, likely to underestimate the true cohort effect. The reason is that we ask respondents to compare the expected net pension to their current net income. For persons with an increasing wage profile (as is typical for Austria, in particular for white-collar workers), we would expect a negative coefficient on age even if there were no additional cohort effects.*

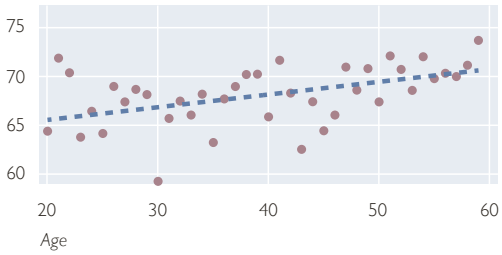
expected replacement rates (see box 2). For an exogenously given retirement age one would expect a positive coefficient since in the Austrian system a higher retirement age is associated with a higher replacement rate. The retirement age used in this question is, however, not an exogenous variable but rather the expected individual value. The negative sign could thus indicate that individuals who expect a lower net replacement rate also expect to retire later in order to increase their old-age pension income.

As in section 2 we could again look at the net replacement rate expectations for respondents' partners and people 30 years younger than the respondents. The average figures are 68% (for respondents' own pension income), 68.3% (for their partner's) and 58.7% (for younger people). Working respondents thus expect their partners' replacement rate to be almost identical to their own while retirees expect the younger cohorts to have considerably lower rates (their own average is also around 68%). In order to test for a time trend one can look again at univariate regressions. The coefficients on age are 0.16 for respondents' own and 0.19 for the partner measure while the one for younger people is not statistically significant.

Chart 3

Net replacement rate expectations by age

Expected net replacement rate



Source: Authors' calculations based on an OeNB survey (2014).

Overall, people seem to find it hard to make accurate predictions about their pension benefits.

4 Uncertainty

There are many reasons why individuals may feel uncertain about their future retirement behavior and pension benefits, e.g. labor income risk, employment risk, uncertainty about their family and health status and about the future of the pension system (see Dominitz and Manski, 2006). Most of the sources of uncertainty are beyond the scope of pension policy. A pension system can, however, try to reduce the extent of political uncertainty by establishing a set of transparent and comprehensible rules, by communicating these rules and the inherent incentives in an effective manner and by safeguarding sustainability in order to reduce the risk of further changes and reforms.

It is thus interesting to also look at the extent of subjective uncertainty about one's own expected retirement behavior and expected pension benefits and also to relate it to socio-economic characteristics. This analysis is also important from an economic point of view since uncertainty can have an effect on precautionary savings and other crucial decisions concerning portfolio allocation, education and labor supply.

Our survey included a series of questions which allow us to infer the degree of uncertainty that respondents have about their answers concerning their expected retirement age and replacement rates (see box 2 on the details). We measure the individual degree of uncertainty by using the standard deviation and the coefficient of variation (the standard deviation divided by the mean, C.V.). In table 4 we present the summary statistics for this

Box 2

Eliciting uncertainty from the survey

We included two questions in our survey in order to elicit information about respondents' expected retirement age. On the one hand we directly asked: "At what age do you realistically expect to enter into retirement?" On the other hand, we also asked a series of questions that allowed us to gauge the extent of uncertainty surrounding individual expectations. In particular, we used a procedure that follows Dominitz and Manski (2006) and Guiso et al. (2013). We asked respondents about the earliest age (R_{min}) and the latest age (R_{max}) at which they could imagine to leave the labor force. In a further step, we asked them to provide a probability that the retirement age will be higher than the midpoint of this span, i.e. $Prob(R \geq \frac{R_{min} + R_{max}}{2} \equiv \bar{R}) = p$. *Making an assumption about the subjective distribution in the interval between R_{min} and R_{max} allows us to estimate subjective moments like the mean, the standard deviation or the coefficient of variation. Details of the procedure can be found in Dominitz and Manski (2006) and Guiso et al. (2013). In this article we show results that are based on the assumption of a triangular subjective distribution.*

In a similar manner we also asked respondents a three-part question about their expectations about the future replacement rate that also referred back to the answer about their expected retirement age $\bar{R}$. In particular, the question concerning the minimum value was: "Imagine you retire at the age of $\bar{R}$ [if the question has not been answered then 60]. Think only about public pension benefits (i.e. disregard occupational or private pension insurance). What is the minimum percentage of your current net income that you expect your monthly net pension to be?"

A critical issue of these probabilistic questions is that they are complicated and lead to rather high nonresponse rates and shares of incorrect (inconsistent) answers (see Dominitz and Manski, 2006). In our survey the nonresponse rate on the retirement questions is 18% and the one on the replacement rate questions almost 30%.

exercise, comparing our own data with the results of a similar study conducted by Guiso et al. (2013) for an Italian sample.

The results show that expectations about the replacement rate vary considerably between individuals. The standard deviation for Austria is lower (12.6) than the one for Italy (19.5), which indicates that Austrians have more homogenous expectations about their replacement rate. At the same time, the subjective uncertainty about the expected replacement rate is higher in Austria (4.64) than in Italy (3.11).[13]

The results for retirement age are qualitatively similar, showing less interpersonal dispersion in Austria but at the same time a higher degree of subjective uncertainty.[14] Retirement age uncertainty, however, is lower than uncertainty about the replacement rate (a C.V. of 1.75 vs. 4.64).

The degree of subjective uncertainty is not the same for all respon-

[13] *We want to note, however, that the figures are not directly comparable. First, the question in the Italian survey was "At the time of retirement, what is the minimum fraction of labor income that you expect to receive?" This question is less specific than our own questions and one could assume that respondents will refer to the gross replacement rate and that they will think of the fraction of the first pension as compared to the last labor income rather than to the current one. Furthermore, our question used a reference retirement age, which was not the case in the Italian survey.*

[14] *The figures in table 3 refer to the probabilistic question about the retirement age, in which we use a specific assumption about the subjective distribution to derive the subjective moments. Both the mean and the median are lower than the corresponding values (63) for the direct question of the expected retirement age that we have used in section 2. The standard deviation, however, is comparable (3.7 vs. 3.6, respectively).*

dents but varies with individual characteristics like age. Chart 4 illustrates that the degree of uncertainty is considerably higher among younger people than for those who are close to retirement: 2.3% vs. 0.8% for the retirement age and 5.5% vs. 3.2% for the replacement rate. Regression analyses confirm this pattern. The negative relation makes sense since young people face higher risks concerning their labor incomes and employment as well as the political risk of a change in the pension system. In addition, older people may be better informed about their pension benefits, which also reduces their subjective uncertainty. Finally, younger people may also have less faith in the sustainability of the entire pension system.

We can look into the latter issue by analyzing agreement with the following statements, which was part of the survey: "Young people can only expect a very small pension from the public pension system" while the second read: "There will be drastic pension reforms in the future." The percentage of respondents that agreed with these statements was very similar for both and astonishingly high: 43%–44% expressed

Table 4

Summary statistics of subjective replacement rate and retirement age distributions in Austria and Italy

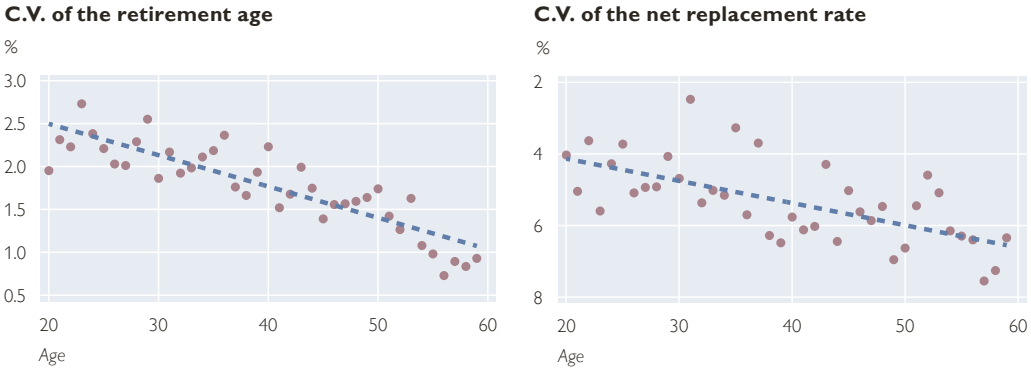
	Austria			Italy		
	Mean	Median	SD	Mean	Median	SD
Replacement rate						
Mean	68.03	69.33	12.6	67.24	71.33	19.48
SD	2.98	2.47	2.21	1.78	1.78	1.59
Coeff. of variation	4.64	3.78	3.85	3.11	2.41	3.22
Retirement age						
Mean	61.63	61.6	3.6	64.36	63.68	5.85
SD	1.07	0.96	0.7	0.68	0.6	0.65
Coeff. of variation	1.75	1.56	1.17	1.06	0.96	0.99

Source: Authors' calculations based on an OeNB survey (2014) for Austria and Guiso et al. (2013) for Italy (whose data stem from a survey conducted in 2007).

Note: The table shows summary statistics of subjective replacement rate and retirement age distributions using probabilistic questions (see box 2).

Chart 4

Coefficient of variation of subjective replacement rate and retirement age



Source: Authors' calculations based on an OeNB survey (2014).

strong agreement and another 40% said they agree somewhat. The age pattern of agreement, however, was rather weak.

5 Knowledge about the pension system and the role of better information

One goal of the establishment of the pension account system has been to increase the transparency and comprehensibility of the system and pension calculation formulas. Every insured person has an individual pension account, which contains all their pension claims accrued so far, thereby helping people to estimate their future benefits. This will facilitate retirement planning, prevent negative surprises and reduce subjective uncertainty. In this section we investigate whether this goal has already been achieved. In the first part we use three survey questions in order to single out better informed respondents, and in the second part we study whether respondents' answers reflect the rules of the new system.

5.1 Do better informed people have different expectations?

At the time of our survey the pension account system has just been established and we want to use this "natural experiment" to investigate whether better knowledge about the structure of and the formulas used under the system have an effect on expected retirement behavior, expected pension benefits and the extent of uncertainty. Our survey included a number of questions that allow us to distinguish between individuals that are better informed and those who are less informed.

One question asked whether people have heard about the new pension account system. This is a rather coarse measure of knowledge but one would assume that knowing the system to be a precondition for understanding the formulas of the new system. Two additional questions were related to a specific episode of the pension reform process in Austria. We have mentioned in section 1 that the transition from the old to the new system involved the calculation of an initial pension credit that has been transferred to the pension accounts in 2014 for all persons born after 1955. In order to calculate those claims correctly the pension insurance agency PVA sent letters to insured persons from the cohorts 1958 to 1990 in which the new pension account system was described and people were asked to provide possibly missing information about contributory and noncontributory periods (for education, childcare, employment abroad etc.). We asked respondents whether they had received such a letter and whether they had returned the completed questionnaire to the agency. It can be expected that individuals who have received this letter and completed the form might differ from the rest of the population in that they have spent some time thinking about the new system and their own retirement plans, which in turn could have an effect on their expectations and their perceived uncertainty. We want to note, however, that these letters did not contain any direct information about the pension benefits the insured person may expect at retirement. This figure was provided in the "initial account information," which was sent to every insured person in 2014 after our survey has been completed.

Even before the calculation of the initial credits it had been possible to ask the PVA for a pension account statement. This statement also provided information related to one's accrued pension entitlements. This amount, however, was typically not indicative of a person's actual benefits since it only re-

ferred to the pension benefits that have been accumulated in the new system. The actual pension benefits, however, were based on "parallel accounting" (i.e. a mixed system of calculations based on previous and new legislation). We also asked respondents whether they had ever asked for such a pension account statement since one could again assume that this group of people is more interested in the topic of retirement and arguably also more knowledgeable about the pension formulas and retirement incentives, which may have an impact on expectations and perceived uncertainty.

In other words, we have three questions that allow us to distinguish between better and less informed respondents (see also table 5):

- the question whether they have heard about the new system ("have heard"),
- the question whether they have received the letter from and returned the questionnaire to the PVA ("received letter")
- and the question whether they have ever asked for a pension account statement ("asked for statement").

The percentages answering "yes" to these three questions were 73%, 30% and 36%, respectively. We would expect the last question to allow the clearest distinction between two groups. The application for an account statement is an active step that suggests a high interest in one's own retirement. On the other hand, the first question is not very selective since the fact of having heard about the new system does not mean that one knows any of the details or that one has thought about the own future behavior.

In table 5 we document the coefficients of the three information variables in twelve separate regressions. Each of these regressions follows the benchmark specification in column (1) of table 1 and includes just a single additional variable. The dependent variables are expected retirement age, expected replacement rate and the coefficient of variation of these two variables as a measure of subjective uncertainty. In most specifications it does not seem to be the case that a higher level of information has a significant effect on expectations or subjective perceptions. Only for expected retirement age do the results indicate that communication with the PVA increased the expected age by 0.6 to 0.8 years. We cannot say more on the issue why information does not have more of an effect. Maybe the provided information is not helpful and sufficient to reduce uncertainty. On the other hand, it may simply have no effect on people's plans and expectations. This would be in line with the results of Mastrobuoni (2011), who has found for the U.S.A. that people who receive the annual Social Secu-

Table 5

The impact of knowledge

	(1)	(2)	(3)	(4)
Dependent variable	*Exp. ret. age*	*Exp. repl. rate*	*Coeff. of var. ret. age*	*Coeff. of var. repl. rate*
Have heard	0.30	1.44	0.01	–0.31
Received letter	0.57**	–0.41	–0.03	0.31
Asked for statement	0.76***	0.10	0.05	0.76**

Source: Authors' calculations based on an OeNB survey (2014).

*Note: The table reports OLS estimates using population weights.***, **, * denote significance at the 0.01, 0.05 and 0.10 level, respectively. The dependent variable is different in the four columns. In each case we have run a regression like the benchmark specification in column (1) of table 1 and added one-by-one the three informational dummy variables. We report only the coefficient of these informational variables.*

rity Statement have a better knowledge about their benefits without changing their retirement expectations or behavior.

5.2 Do the survey answers indicate knowledge of the new pension system?

There exists another dimension along which we can assess people's knowledge about the new pension system: If people are familiar with the workings of the system, their answers should reflect its basic rules. Equation (1) in section 1 expresses the core relation of the system: the 45–65–80 rule together with the deductions (supplements) for early (late) retirement.

As a first test we can analyze whether people have, on average, accurate perceptions of the system and realistic expectations about the benefits they will receive in the future. We can use a back-of-the-envelope calculation: in our core sample the average expected retirement age is 63.1 and respondents indicate to have started to work, on average, at the age of 17.8. This implies an expected number of insurance periods of almost exactly 45 years (if we disregard periods in which individuals might be out of the labor force). According to the formula this would imply a replacement rate of (45x1.78%)x (1–2x0.051)=72%. In the data we have found an expected replacement rate of 68%, which at first sight – seems to be more or less aligned with this back-of-the-envelope value.[15] There are, however, two caveats to this observation. First, the basic formula refers to the gross replacement rate while the question was about the *net* replacement rate. In OECD (2013, p. 217) the figures suggest that the average net replacement rate will be about 17% higher than the gross rate. This would imply that the gross value of 72% corresponds to a net value of about 84%, which is considerably higher than the average answer of 68%. Second, the basic formula specifies the pension benefits as a fraction of average *lifetime* earnings while the question refers to respondents' *current* income. If there is an age-specific, upward-sloping wage profile, this difference is not innocuous. In order to evaluate the direction and the size of the bias, we would have to delve deeper into the age pattern of expectations and wage profiles.

Overall we can say that on average, the expectations measured in the survey are more or less in line with the rules of the actual system or at least not completely off the mark. However, repeating this exercise on an individual level produces more mixed results. A regression of expected replacement rates on individual expected insurance years (defined as the individually expected retirement age minus the individual age of labor market entry) gives a negative sign of the latter variable. This is similar to the negative sign of the expected retirement age in column (3) of table 3 and has to do with the fact that the expected retirement age cannot be treated as an exogenous variable. One way to circumvent this problem is to look at a difference-in-difference framework, in particular at the subjective assessment of how much the replacement rate will change if the retirement age decreases by one year. In the current system this value is given by the derivative of equation (1) with respect to R_i. The exact number depends on the

[15] *In a comparable study for the U.S.A., Dominitz and Manski (2006) come to a similar conclusion, i.e. that "respondents have a reasonable general sense of the benefits they would receive" (p. 222). Compare also the study by Liebman and Luttmer (2012).*

value of R_i but it can be calculated to be around 7% (note that this is also approximately equal to the sum of the deduction 5.1% and the "lost" accrual rate for one year 1.78%). In our survey we can approximate this subjective deduction by using the maximum and minimum values for the expected retirement age and replacement rate. In particular, we treat the expression $\frac{NRR_{max} - NRR_{min}}{R_{max} - R_{min}}$ as a measure of this subjective incentive. If we do so, the average subjective reduction is around 3.5% (the median 3%), i.e. about half the actual value. Again, there are a number of strong caveats to this statement. First, we assume in these calculations that respondents see a higher or lower retirement age as the only reason for a lower or higher replacement rate. Second, the survey question about the minimum and the maximum replacement rate indicated a reference retirement age. Our calculation thus assumes that people disregard this information and implicitly expect lower and higher retirement ages.

Overall we conclude that individual answers do not suggest that the main mechanisms of the new Austrian pension account system are well understood. Subjective uncertainty concerning the level of the expected net replacement is high and people do not seem to perceive the full size of the disincentives to early retirement that are inherent in the system. This would indicate that the efforts to communicate and popularize the main elements of the system should be stepped up. At the same time, however, we have to admit that the imprecision and sometimes inconsistency of the results may be not only due to respondents' ignorance of the system but also due to the complicated nature of the questionnaire itself. It is simply much easier to provide one's own expected retirement age than to give a meaningful assessment of the expected net replacement rate, which is also confirmed by the different nonresponse rates for these two questions. Answering the latter not only requires some knowledge of the formulas of the system, but also taking into account the entire employment and earnings path up to the (unknown) retirement age; also, the implied gross replacement rate has to be calculated and, finally, translated into a net concept compared to current income. Doing all this requires quite a high degree of knowledge. Unfortunately, this complexity is inherent in the nature of the question about future pension benefits and it is not straightforward to come up with a less demanding alternative. Despite these difficulties we think that our survey answers provide us with useful information concerning expectations and possible behavioral responses.

6 Conclusions

Increasing the retirement age is a hot topic of public debate in Austria and a top policy priority. In this article we use survey evidence on retirement expectations to gain information about the likely future development of the average retirement age. Our results include encouraging, but also some cautionary messages.

On the positive side, we find that the expected retirement age is higher for younger cohorts, in particular it increases by about 1 year for every 13 years of age difference. This effect is not overly strong but it suffices to counterbalance the rise in the forecasted life expectancy for the next decades. Furthermore, subjective retirement expectations imply a path for the average effective retirement age that is above the assumptions that underlie official forecasts. Our data do not allow us to pre-

cisely determine the reasons for this expected increase. We conjecture that it has to do with the rules of the new pension account system, media coverage and the public debate surrounding the various steps of the pension reform process and possibly also with cohort-specific changes in preferences.

Our analysis provided, however, also results that are less favorable and in fact somewhat worrisome. First, we find that the current gap between the retirement ages of men and women (about 2.5 years) is not expected to be reduced in the next 50 years, despite the fact that in 2034 the statutory retirement age for women will be equal to the one for men. Second, we discover a high degree of uncertainty, insufficient knowledge about the main rules of the new pension system and an only modest influence of better information on behavioral expectations and uncertainty perceptions. There is good reason to speculate that the increase in expected (and subsequent actual) retirement behavior would be even stronger if the incentives that are inherent in the new system were better or more widely understood.

Our results thus suggest that the main principles of the new pension account system should be communicated more effectively to the public.[16] Information about the pension account could play a key role in this regard. At the moment, all insured persons can obtain account information about their valorized contributions online from the pension insurance agency PVA. There is, however, no automatic mailing of the information, which could increase its general visibility. Furthermore, also the content could be improved, e.g. by providing more individualized information and more details about expected pension benefits at earlier or later retirement ages. Countries in which active and open communication between government and citizens has a longer tradition (like Sweden) could serve as useful role models in this respect.

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[16] *There is a debate about the effectiveness of informational interventions for labor supply and retirement behavior. Liebman and Lutmer (2015) found, e.g., that the provision of an informational brochure and the invitation to a web tutorial on the U.S. Social Security System increased labor force participation one year later by 4 percentage points.*

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Annex

Table A1

Summary sample statistics

	Mean	SD	Min	Max	N
Age	39.68	10.73	20	59	1,251
Female	0.53	0.50	0	1	1,251
Marital status					
Married	0.55	0.50	0	1	1,251
Single/divorced	0.44	0.50	0	1	1,251
Widowed	0.01	0.11	0	1	1,251
Income	1,516.80	616.88	0	5,300	857
Education					
Compulsory	0.06	0.23	0	1	1,251
Vocational	0.64	0.48	0	1	1,251
Upper secondary	0.16	0.36	0	1	1,251
University	0.15	0.35	0	1	1,251
Employed in public sector	0.18	0.38	0	1	1,240
Labor market status					
ILF: unemployed	0.06	0.24	0	1	1,251
ILF: self-employed	0.07	0.25	0	1	1,251
Domestic resident	0.87	0.33	0	1	1,249
Bad health	0.15	0.36	0	1	1,250
Expectations					
Exp. own ret. age	63.07	3.73	53	80	1,104
Exp. partner ret. age	62.67	3.78	50	80	524
Exp. ret. age of younger people	65.87	3.02	55	80	467
Exp. net replacement rate	68.03	12.60	23.33	100	853
Subj. SD of exp. ret. age	1.07	0.70	0	4.83	891
Subj. SD of exp. NRR	2.98	2.21	0	14.18	853
Information					
Have heard	0.77	0.42	0	1	1,251
Received letter	0.59	0.49	0	1	1,251
Asked for statement	0.23	0.42	0	1	1,251

Source: Authors' calculations based on an OeNB survey (2014). Our sample is confined to all individuals that are in the labor force (a total of 1,310) and that are between 20 and 59 years old.

Table A2

Expected retirement age (complete version of table 1)

	Benchmark	No income	Male	Female
Dependent variable	*Exp. ret. age*	*Exp. ret. age*	*Exp. ret. age*	*Exp. ret. age*
Age	−0.065***	−0.061***	−0.068***	−0.069***
	(0.014)	(0.012)	(0.022)	(0.019)
Male	2.247***	2.740***	–	–
	(0.266)	(0.219)		
Married	0.094	−0.049	0.190	−0.306
	(0.282)	(0.241)	(0.418)	(0.403)
Widowed	−0.450	−1.769***	−0.628	−0.578
	(0.467)	(0.652)	(1.028)	(0.580)
Unemployed	1.569**	0.196	1.706*	1.567
	(0.650)	(0.579)	(0.895)	(0.983)
Self-employed	1.084*	0.642	0.379	2.595*
	(0.604)	(0.450)	(0.694)	(1.556)
Employed in public sector	−0.485	−0.473*	−1.052**	0.322
	(0.305)	(0.272)	(0.466)	(0.384)
Domestic resident	0.167	−0.043	0.013	0.763
	(0.370)	(0.311)	(0.531)	(0.562)
Bad health	−1.714***	−0.819**	−2.404***	−0.899
	(0.474)	(0.417)	(0.774)	(0.594)
Education: vocational	−0.785	−0.511	−0.634	−0.875
	(0.580)	(0.471)	(0.934)	(0.810)
Education: upper secondary	−0.713	0.275	−0.305	−1.403
	(0.635)	(0.525)	(1.027)	(0.880)
Education: university	0.380	1.140**	0.262	0.526
	(0.692)	(0.547)	(1.033)	(0.987)
Income	2.029***	–	2.788***	1.970
	(0.586)		(0.898)	(1.599)
Income^2	−0.250**	–	−0.347**	−0.521
	(0.098)		(0.138)	(0.453)
Constant	63.104***	64.548***	64.496***	63.717***
	(0.957)	(0.805)	(1.420)	(1.726)
Regional dummies	YES	YES	YES	YES
Adjusted R^2	0.255	0.218	0.164	0.121
N	770	1,095	373	397

Source: Authors' calculations based on an OeNB survey (2014).

*Note: The table reports OLS estimates using population weights. (Robust) standard errors are reported in parenthesis and ***, **, * denote significance at the 0.01, 0.05 and 0.10 level, respectively. The dependent variable is expected retirement age. Its average value for the two subsamples is 64.5 (male) and 61.8 (female).*

Table A3

Expected net replacement rate (complete version of table 3)

	Benchmark	No income	Ret. expectations
Dependent variable	*Exp. net repl. rate*	*Exp. net repl. rate*	*Exp. net. repl. rate*
Age	0.090*	0.157***	0.102*
	(0.052)	(0.048)	(0.055)
Male	–3.140***	–2.111**	–1.430
	(1.018)	(0.949)	(1.168)
Married	0.875	1.411	1.085
	(1.021)	(0.946)	(1.123)
Widowed	3.763	0.809	3.578
	(2.881)	(3.989)	(3.118)
Unemployed	–3.904	–4.189*	–3.828
	(2.581)	(2.382)	(3.096)
Self-employed	–4.853	–3.684	–4.141
	(3.144)	(2.331)	(3.320)
Employed in public sector	0.897	1.273	1.316
	(1.428)	(1.203)	(1.570)
Domestic resident	1.607	1.000	–0.077
	(1.652)	(1.567)	(1.775)
Bad health	–1.834	–1.115	–2.897
	(1.575)	(1.468)	(1.847)
Education: vocational	2.735	1.040	2.176
	(2.705)	(2.670)	(3.353)
Education: upper secondary	0.329	–1.946	–0.701
	(3.015)	(2.931)	(3.691)
Education: university	0.811	–0.211	–0.470
	(2.974)	(2.880)	(3.619)
Income	–0.243	–	–0.808
	(2.909)		(2.591)
Income^2	0.325	–	0.635
	(0.580)		(0.460)
Expected retirement age	–	–	–0.410*
			(0.230)
Constant	63.811***	62.214***	89.673***
	(4.249)	(3.443)	(15.119)
Regional dummies	YES	YES	YES
Adjusted R^2	0.084	0.068	0.096
N	667	850	535

Source: Authors' calculations based on an OeNB survey (2014).

*Note: The table reports OLS estimates using population weights. (Robust) standard errors are reported in parenthesis and ***, **, * denote significance at the 0.01, 0.05 and 0.10 level, respectively. The dependent variable is the expected net replacement rate.*

Notes

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http://www.oenb.at/en/Publications/Economics/Working-Papers.html

Proceedings of the Economics Conference
English | annually

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http://www.oenb.at/en/Publications/Economics/Economics-Conference.html

Proceedings of the Conference on European Economic Integration
English | annually

The OeNB's annual Conference on European Economic Integration (CEEI) deals with current issues with a particular relevance for central banking in the context of convergence in Central, Eastern and Southeastern Europe as well as the EU enlargement and integration process. For an overview see:
http://www.oenb.at/en/Publications/Economics/Conference-on-European-Economic-Integration-CEEI.html
The proceedings have been published with Edward Elgar Publishers, Cheltenham/UK, Northampton/MA, since the CEEI 2001.
www.e-elgar.com

Publications on banking supervisory issues
German, English | irregularly

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