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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 2015 should be e-mailed to *eva.gehringer-wasserbauer@oenb.at* by May 1, 2015.

Applicants will be notified of the jury's decision by mid-June. The following round of applications will close on November 1, 2015.

Analyses

Austria: Economic Growth in 2014 at 0.4%

Christian Ragacs,
Fabio Rumler,
Martin Schneider[1]

1 Austria's Economic Growth in 2014 Disappointing

Despite geopolitical tensions, the euro area managed to overcome the recession in 2014. Inflation slowed quickly from mid-2014 due to falling crude oil and food prices and dipped into negative territory at the turn of the year. Monetary policy makers reacted with additional interest rate cuts and an asset purchasing program and supplied further long-term liquidity to the banking sector. At +0.4%, Austria's economic growth was disappointing, however, lagging behind the euro area (+0.9%) and Germany (+1.6%). Austria thus registered real GDP growth of less than 1% for the third consecutive year in 2014.

Growth in 2014 was borne by expansion in the second half of 2013 and first half of 2014, as the Austrian economy stagnated in the second half of 2014. Consumer spending did not increase in any quarter of 2014, and gross fixed capital formation started to contract in the second quarter and then declined at a more pronounced pace in the third and fourth quarters. By contrast, exports showed positive growth rates in all four quarters. Since imports decreased in the second half, net exports in that period contributed positively to GDP growth, but that was offset by a negative contribution from domestic demand and changes in inventories.

Industrial production including construction contracted slightly in 2014 (–0.5%). This decline is attributable to the energy and construction sectors (–10.6% and –1.5%, respectively). On the other hand, industrial production (industrial production excluding steam and air conditioning supply, which is not sensitive to the economic cycle: NACE B–D excluding D353) increased slightly (+0.7%). Developments in the course of the year exhibited an upward trend toward the end of 2014 (+0.4% in the fourth quarter), while the energy and construction sectors continued to shrink in the fourth quarter.

Table 1

National Accounts

	GDP	Private consumption	Government consumption	Gross fixed capital formation	Exports	Imports	Domestic demand (excluding inventories)	Net exports	Inventory changes and statistical differences
	Quarterly and annual changes in % (seasonally adjusted trend-cycle series)						*Contributions to GDP growth in percentage points*		
Q3 13	+0.2	+0.1	+0.2	+0.5	–0.2	+1.1	+0.2	–0.6	+0.7
Q4 13	+0.2	+0.1	+0.1	+0.2	+0.4	+1.0	+0.1	–0.3	+0.4
Q1 14	+0.1	+0.0	+0.1	+0.4	+0.8	+0.8	+0.1	+0.1	–0.1
Q2 14	+0.1	–0.0	+0.1	–0.1	+0.1	+0.2	–0.0	–0.0	+0.1
Q3 14	–0.0	+0.0	+0.2	–1.0	+0.2	–0.4	–0.2	+0.3	–0.1
Q4 14	+0.0	+0.0	+0.2	–1.1	+0.2	–0.5	–0.2	+0.4	–0.1
2012	+0.7	+0.5	+0.2	+1.2	+1.5	+0.7	0.6	0.4	–0.3
2013	+0.3	–0.2	+0.3	–1.0	+1.3	+0.1	–0.3	+0.6	–0.1
2014	+0.4	+0.1	+0.5	–0.0	+1.5	+1.9	+0.2	–0.2	+0.4

Source: Austrian Institute of Economic Research (WIFO).

[1] *Oesterreichische Nationalbank, Economic Analysis Division, christian.ragacs@oenb.at, fabio.rumler@oenb.at and martin.schneider@oenb.at.* *Portions of this article have appeared in German in OeNB. 2015. Konjunktur aktuell. Berichte und Analysen zur wirtschaftlichen Lage. March.*

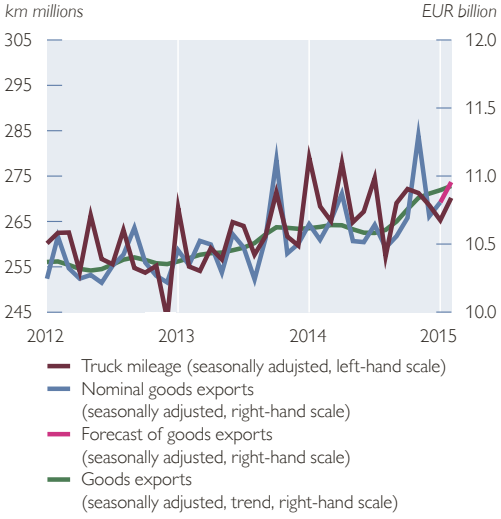
2 Moderate Economic Recovery in 2015: Situation Better than Sentiment

A mixed picture for the Austrian economy emerges from the indicators in the beginning of 2015. The confidence indicators show a significant worsening of sentiment among domestic consumers and businesses in February. But this decline appears to exaggerate the current situation somewhat, since the framework for an economic upswing is certainly intact. In addition to a positive fourth quarter in 2014, growth of industrial output was also slightly positive in January 2015. The trend in goods exports is likewise headed upward. The OeNB export indicator, based on truck mileage data from the Austrian highway authority ASFINAG, points to an upward trend of exports for January and February of this year. The prospects for consumer spending have also improved. The retail sector recorded significant increases in December 2014 and January 2015. Real wages have risen more than at any time in over five years due to the slowing of inflation. Employment has also continued to climb in the beginning of 2015, but that has been accompanied by a growing supply of labor and hence a rising unemployment rate.

Overall, however, the impetus should be strong enough to result in a moderate economic upswing in Austria. The OeNB's current short-term forecast calls for real GDP growth in the first and second quarters of 2015 of +0.2% and +0.3% (seasonally and working-day adjusted, compared with the previous quarter). But Austria's growth is likely to remain below that of Germany and the euro area. The Austrian economy will benefit in the first half of 2015 from the recovery in the euro area, significantly lower energy prices compared with last year, and depreciation of the euro against the U.S. dollar and Swiss franc. While the tax reform will not give households relief

Chart 1

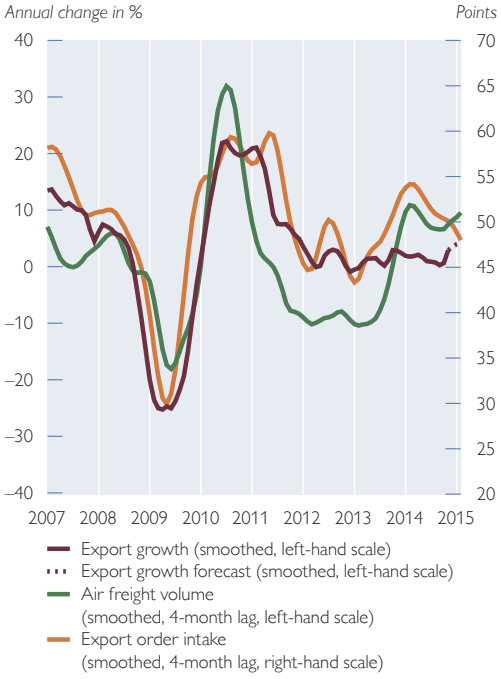
Truck Mileage and Goods Exports



Source: Austrian highway authority ASFINAG, OeNB.

Chart 2

Leading Indicators for External Trade

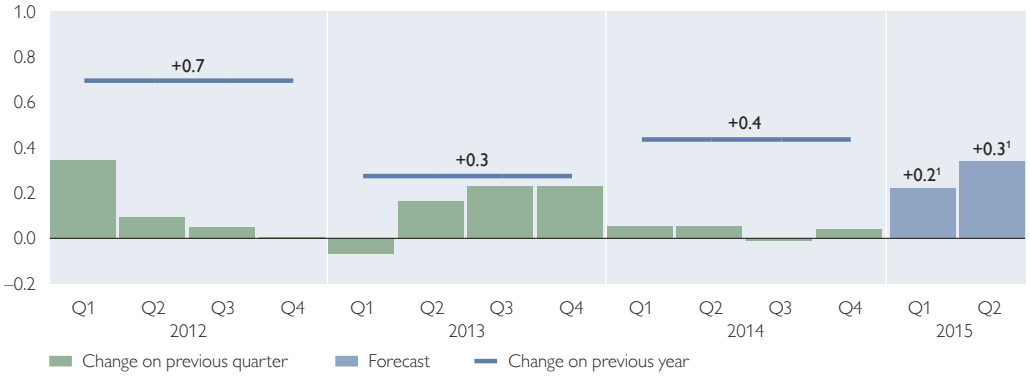


Source: Statistics Austria, Austrian highway authority ASFINAG, OeNB.

Chart 3

Short-Term Outlook for Austria's Real GDP for the First and Second Quarter of 2015

Change on previous quarter/year in % (seasonally and working-day adjusted trend-cycle series)



Source: OeNB Economic Indicator from March 2015, Eurostat.

[1] *Forecast.*

until 2016, it could bolster confidence and thus trigger anticipatory effects.

According to the Austrian results of the April 2015 round of the Bank Lending Survey, Austrian banks tightened their credit standards for loans to enterprises as well as for consumer loans to households marginally in the first quarter of 2015, whereas standards for housing loans remained stable. Corporate loan demand increased slightly, according to the respondents, as did demand of households for housing loans, whereas demand for consumer loans fell somewhat.

Table 2

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	+1.3	260.6	+5.7	7.0	7.0	4.9	29,422	–8.9
2013	3,483	+0.5	287.2	+10.2	7.6	7.6	5.4	26,383	–10.3
2014	3,503	+0.6	319.4	+11.2	8.4	8.4	5.6	26,320	–0.2
Q1 14	3,448	+0.7	348.6	+9.5	9.2	8.0	5.6	24,495	–0.7
Q2 14	3,505	+0.7	293.3	+14.7	7.7	8.3	5.7	28,863	+2.6
Q3 14	3,566	+0.4	290.3	+11.5	7.5	8.5	5.7	27,647	–2.0
Q4 14	3,495	+0.6	345.2	+9.8	9.0	8.5	5.7	24,276	–0.9
Sep. 14	3,551	+0.5	292.1	+11.8	7.6	8.6	5.7	28,516	–0.5
Oct. 14	3,519	+0.5	310.3	+10.7	8.1	8.6	5.7	25,962	+1.6
Nov. 14	3,493	+0.6	331.8	+9.9	8.7	8.6	5.7	24,731	–0.0
Dec. 14	3,472	+0.7	393.7	+9.0	10.2	8.6	5.6	22,136	–4.5
Jan. 15	3,446	+0.6	406.2	+9.8	10.5	8.7	5.5	22,971	+5.6
Feb. 15	3,458	+0.4	397.6	+11.4	10.3	8.8	x	25,362	+3.3

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

3 Unemployment Expected to Remain High

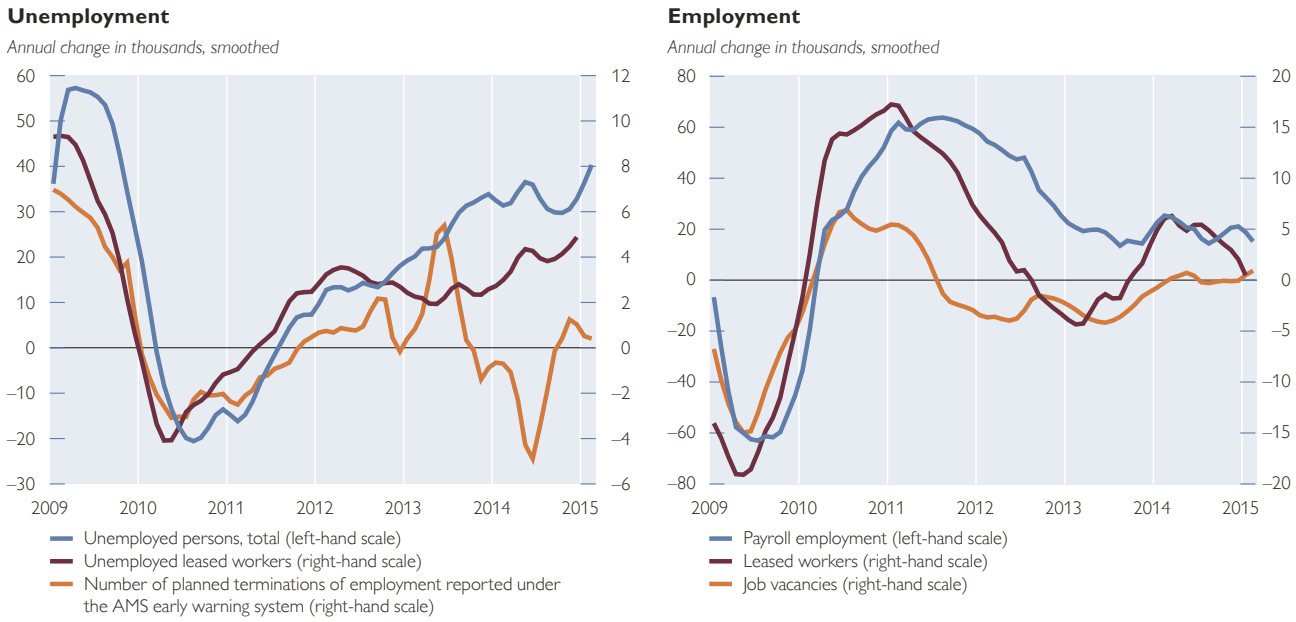
The employment trend was remarkably robust in 2014, as in the years before, despite the weak economic trend. The number of employed persons still showed positive rates of change. At the same time, however, unemployment continued to climb in view of rising labor participation rates among women and older workers as well as the continuing influx of foreign workers.

The data for the Eurostat unemployment rate were revised upward in March 2015, including historical figures.[2] Accordingly, the unemployment rate in 2014 was 5.6%, up by 0.2 percentage points compared with 2013. Because of the historical revisions, Austria's unemployment rate was no longer the lowest in the EU in 2013 and 2014, but rather the second-lowest after Germany's (5.2% and 5.0%).

The trend of rising employment and labor supply and a stable seasonally adjusted unemployment rate appears likely to continue in the months ahead. The stabilization of job vacancies signals further employment growth in the course of the year, but the declining momentum in the number of leased workers suggests a slowdown. In the same vein, no clear signals are coming from the number of planned layoffs reported to the Public Employment Service Austria AMS under its early warning system. Overall, however, the still very weak economic environment suggests that employment growth will not be strong enough in the months ahead to allow unemployment to fall.

Chart 4

Leading Indicators



Source: Statistics Austria, Public Employment Service Austria (AMS).

[2] *The basic data used to calculate the unemployment rate come from the European Union Labour Force Survey (EU LFS) conducted in the framework of the Austrian microcensus. The projections from this survey have undergone slight revisions in 2015 that go back to 2004. Among other things, "non-responses" have been reassigned and weighted. Before the revision, Austria's 2014 unemployment rate stood at 5.0%.*

4 Inflation Declines to 0.5% in January and February 2015 Due to Falling Oil Prices; OeNB Expects Inflation Rate of 0.8% for 2015

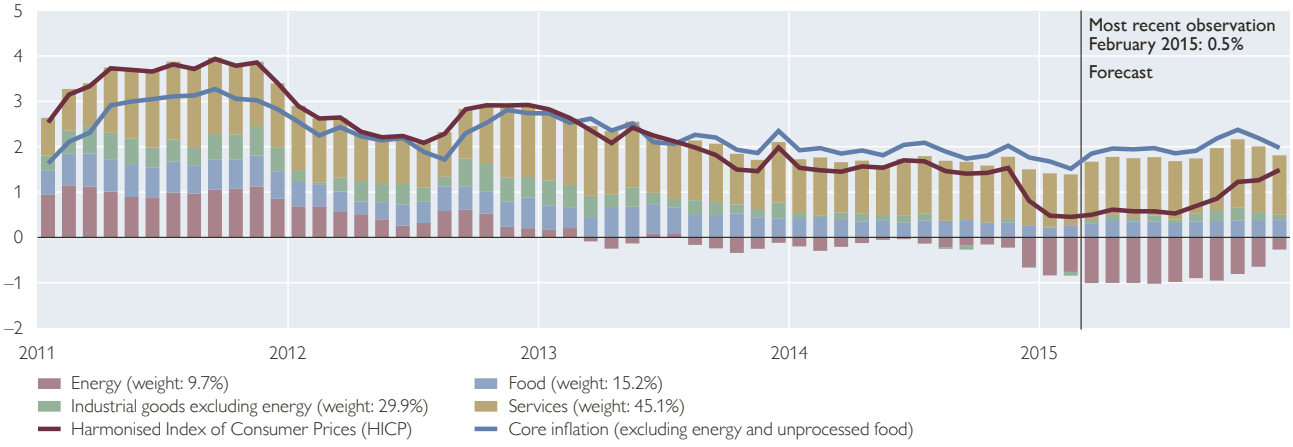
Having fallen at the end of 2014 from 1.5% in November to 0.8% in December, Austria's HICP inflation rate continued to slow in January 2015 to 0.5%. It remained at that level also in February. The inflation rate had thus declined by 1 percentage point within a few months. By contrast, the core inflation rate (excluding energy and unprocessed food) dropped only slightly in the same period, to 1.5% in February 2015 (after 1.7% in January and 1.8% in December 2014). It is thus clear that the sharp decrease in recent months is due to the development of energy prices and especially fuel prices. The annual rate of change for energy prices went down from –2.4% in November 2014 to –9.5% in January 2015 and back up slightly to –8.6% in February due to advancing oil prices.

According to its latest forecast, the OeNB expects an average HICP inflation rate of 0.8% for 2015, particularly in light of falling energy prices. Inflation in the services sector and in the industrial goods sector excluding energy is expected to rise slightly during 2015, mainly thanks to the moderately better growth prospects. At 2.0%, the core inflation rate will therefore be significantly higher than headline inflation in 2015. The public sector's contribution to the headline inflation rate will amount to 0.3 percentage points in 2015 and thus decline only slightly compared with 2014. The further tobacco tax hike in April 2015 will add 0.1 percentage points to the HICP inflation rate.

Chart 5

Austrian HICP Inflation and Contributions of Subcomponents

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



Sources: OeNB, Statistics Austria.

Determinants of Inflation Perceptions and Expectations: an Empirical Analysis for Austria

Friedrich Fritzer, Fabio Rumler[1]

This study uses micro data from a survey among 2,000 Austrian households conducted in 2013 to investigate the socioeconomic determinants of inflation perceptions and expectations. In our econometric analysis, we find that socioeconomically disadvantaged respondents (less income, lower educational attainment) and older interviewees tend to have higher inflation perceptions. In contrast, respondents living in larger households or in agglomerations with more than 5,000 inhabitants have lower inflation perceptions. As to inflation expectations, we find that older and less educated people tend to report higher inflation expectations. Additionally, we document that women tend to have higher inflation expectations than men and that knowledge of the Eurosystem's definition of price stability dampens inflation expectations. Moreover, respondents who are skeptical about the reliability of the official inflation indicators state higher inflation expectations. As largely correct and realistic inflation perceptions and expectations are important for the credibility of monetary policy, these results suggest that financial education strategies should be focused on population groups with lower educational attainment, less income and on younger people.

JEL classification: C25, E31, J10
Keywords: inflation perceptions, inflation expectations, socioeconomic characteristics, survey data

Most central banks operate under an explicit or implicit target for price stability. In such a regime, effective monetary policy requires inflation expectations to be well anchored to or near the target. Thus, it is of vital importance for central banks to understand the formation process of inflation perceptions and inflation expectations. While inflation expectations are forward looking, inflation perceptions are backward looking as they reflect people's views about past or current inflation rates.[2] Individuals' perceptions and expectations of inflation may, indeed, affect actual inflation and other economy-wide outcomes (Ireland, 2000). If the public expects higher inflation rates, realized inflation will be higher, as, for example, wage demands will be adjusted upward. Inflation perceptions which differ persistently and over an extended period from official inflation rates could be detrimental to the credibility of the central bank's price stability objective. Moreover, wrong perceptions and expectation errors might affect people's financial decisions about spending, saving and borrowing, which, in the aggregate, can lead to adverse effects on the macroeconomy and on the effectiveness of monetary policy. Therefore, possible misperceptions and expectation errors should be brought in line with actual developments, a process which a central bank can influence by appropriate communication. Achieving this goal is easier if the socioeconomic characteristics which determine inflation perceptions and expectations are known, so that central banks' communication and education efforts can be better targeted to the needs of specific groups.

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[2] *Inflation perceptions can be defined on the basis of a reference-dependent theory of consumer choice, i.e. people have their own reference value for prices of products and measure price changes as the difference between the observed prices and these reference values. The price index of perceived inflation developed by Brachinger in cooperation with the Federal Statistical Office of Germany is based on these principles (see Hoffmann et al., 2005).*

Refereed by: Jan-Oliver Menz, Deutsche Bundesbank

However, with the information at hand it is hard to discern whether individual inflation perceptions and expectations differ from average actual inflation rates because people's individual perceptions and expectations simply reflect the different actual inflation rates they experience, or because people's perceptions and expectations are indeed biased. This assessment has important policy implications because only in the latter case – i.e. if differences between socioeconomic groups are based on misperceptions and errors rather than on actual experiences – we can expect adverse effects on allocation and macroeconomic outcomes. Since we do not observe individuals' actual inflation rates, we focus on the determinants of the magnitude of inflation perceptions and expectations rather than on the deviations from actual values in this study.

Our empirical analysis, in which we attempt to uncover the socioeconomic determinants of inflation perceptions and expectations in Austria, is based on a survey among 2,000 Austrian households conducted during the second quarter of 2013 (IFES, 2013). Our main findings reveal that people with higher income, higher educational attainment, those living in larger households or in urban areas and younger people tend to have lower inflation perceptions. Furthermore, we find that females, older and less educated people tend to have higher short-run and long-run inflation expectations. The respondents' knowledge of the ECB's definition of price stability (our proxy for economic literacy) has a dampening impact on inflation expectations and skeptics about the reliability of the official inflation indicators have more elevated inflation expectations.

Several studies have investigated the determinants of inflation perceptions and inflation expectations based on survey data. As a robust finding, this literature reveals that people with a disadvantaged socioeconomic background (e. g. low income, less educational attainment) have biased inflation expectations/perceptions. Menz and Poppitz (2013) report this feature for Germany, Blanchflower and Mac Coille (2009) for the U.K. and Pfajfar and Santoro (2008) for the U.S.A. To date, only few attempts have been made to investigate this issue for Austria. Fluch and Stix (2005) examined inflation perceptions among Austrians during the euro cash changeover. They found that perceived inflation diverged considerably from actual inflation for a prolonged period around the time of the euro cash changeover in early 2002. In another study, Fluch et al. (2013) conducted a broad descriptive analysis of inflation perceptions and expectations for Austria. Neither of these two Austria-related studies attempted a rigorous econometric analysis of the determinants of inflation perceptions and expectations.

The remainder of this paper is structured as follows: Section 1 discusses the data used in the analysis, provides some descriptive statistics and explains the estimation strategy employed. Section 2 presents and discusses the empirical evidence for the socioeconomic determinants of inflation perceptions and expectations. In section 3, we draw some conclusions and suggest avenues for further research.

1 Data and Estimation Strategy

We use a survey which the Institute for Empirical Social Studies (IFES) conducted on behalf of the Oesterrei-

chische Nationalbank (OeNB) from May to July 2013[3] (OeNB-Barometer), in which 2,000 people above the age of 15 were interviewed. The questionnaire comprised about 30 questions on general aspects of inflation, of which only one part was devoted to inflation perceptions and expectations (IFES, 2013). IFES applied a so-called stratified multistage clustered random sampling strategy to ensure that the respondents were representative – with respect to a number of socioeconomic characteristics – of the general Austrian population.[4]

1.1 Data

The people responding to the survey provided qualitative, quantitative and point estimates for their perceptions and expectations of inflation. In other words, they had to estimate or guess some measure of inflation during past and present (in case of perceptions) or future (in case of expectations) episodes.

The survey additionally contains information on a range of socioeconomic characteristics of the respondents, including education, income, place of residence (in terms of the number of inhabitants in the residential municipality), type of accommodation (rented, own property or other), household size (number of persons in the household), employment status, age and gender. Some of the variables, originally available for a larger number of categories, were consolidated to fewer categories (see the annex for definitions of the variables). For instance, the variable educational attainment in the survey contained 11 different categories ranging from primary school to, at most, university education. We subsumed the 11 different categories under low, medium and high education. Furthermore, we experimented with a variety of possible categorizations for these variables.

Table 1 presents general statistics about important variables used in our analysis.[5] More than 70% of the respondents had completed compulsory

Table 1

Socioeconomic Characteristics

	%	*Cumulative %*
Income		
Low (less than EUR 1,050)	22.3	22.3
Medium (EUR 1,050 to EUR 2,099)	38.2	60.5
High (more than EUR 2,100)	9.6	70.1
Not specified	24.8	94.9
No own income	5.1	100.0
Education		
Lower secondary	71.5	71.5
Higher secondary	15.4	86.9
Tertiary	13.1	100.0
Unemployed		
No	95.7	95.7
Yes	4.3	100.0
Number of people in the household		
1	27.9	27.9
2	38.7	66.6
3 to 4	27.5	94.0
More than 4	6.0	100.0
Housing		
Rent	55.2	55.2
Own property	39.1	94.3
Other	5.7	100.0
Place of residence		
Less than 5,000 inhabitants	39.1	39.1
More than 5,000 inhabitants	60.9	100.0
Gender		
Male	51.6	51.6
Female	48.4	100.0

Source: OeNB-Barometer survey conducted by IFES in the second quarter of 2013.

[3] *At that time, Austrian HICP inflation hovered between 2.1% and 2.4%, i.e. somewhat above its long-run mean since 1999 of 1.9%.*

[4] *See Fluch et al. (2013) for more details on the sampling of the survey; this paper also presents the major results of the survey at the descriptive level.*

[5] *Descriptive statistics along with graphical representations of the distribution of our dependent variables (inflation perceptions and expectations) can be found in Fluch et al. (2013).*

schooling, an apprenticeship or vocational training (lower secondary), broadly 15% had graduated from high school (higher secondary) and 13% had finished tertiary education (university or college). Concerning income, most respondents were in the medium income range (with a monthly net income between EUR 1,050 and EUR 2,100). However, about one-quarter of the interviewees did not indicate their income. Around 4% of the respondents reported to be unemployed. Furthermore, most interviewees' household size was small, with two-thirds of the respondents living in a one- or two-person household. 55% of the respondents lived in rented accommodation and 61% in municipalities with more than 5,000 inhabitants.

1.2 Estimation Strategy

The survey questions relevant for our analysis were designed such that respondents had to report their inflation perceptions and expectations (our dependent variables) in terms of predefined intervals. Consequently, the precise value of their perceptions/expectations remained unobserved. Furthermore, the data were also censored in the sense that the upper-end interval was open (above 5%). An estimation method which can deal with censored interval data is the generalized tobit model – also called interval regression – where the parameters are estimated by means of maximum likelihood (Maddala, 1983, for a general discussion of censored models and Stewart, 1983, for a comparison of estimation methods in the specific case of our application).[6]

We use our survey data to estimate equations of the general form:

$$y = f(age, age^2, gender, education, income, agglomeration, housing, household\ size, employment\ status, economic\ literacy, inflation\ skepticism), \quad (1)$$

where y is the inflation perception or expectation of a given respondent, which, as described above, falls into a specific interval without being precisely known. The explanatory variables included in our econometric specifications are: age, gender, education, income, agglomeration, type of accommodation in which the respondent lives (rented or other types), number of people living in the same household as the respondent, employment status of the respondent and dummies for economic literacy and inflation skepticism.[7]

The inclusion of the variables age, gender, income, education and employment status is motivated by the findings in the related literature: Existing studies on the heterogeneity of inflation perceptions and expectations across demographic groups, such as Pfajfar and Santoro (2008), Blanchflower and Mac Coille (2009), Menz and Poppitz (2013) and Bruine de Bruin et al. (2010), generally find for different countries and different time horizons that older, economically disadvantaged (unemployed, low income) and/or less educated people tend to have comparatively higher inflation perceptions/expectations. In some studies, gender plays a role as well, with women usually showing higher inflation perceptions/expectations than men. Bruine de Bruin et al. (2010) particularly emphasize the role

[6] *In our application, OLS could in principle be applied if the estimates are appropriately adjusted as shown in Stewart (1983). We use a ready-to-use ML estimation method implemented in STATA.*

[7] *See the annex for definitions of these variables.*

of economic/financial literacy in the expectations formation process, which we also test in this paper. The characteristics household size, type of accommodation and place of residence are not common in the literature on the determinants of inflation perceptions and inflation expectations. However, Fessler and Fritzer (2013) found that these variables have an impact on actual household-specific inflation rates. For that reason, we want to investigate whether household size, type of accommodation and agglomeration are relevant variables in our context.

After having estimated the determinants of inflation perceptions, we take a closer look at those respondents whose perceptions were correct and those who did not respond to questions about their inflation perceptions. In particular, we would like to know which socioeconomic features characterize these groups of interviewees. To this end, we run a logistic regression[8] that explains the probability of being among the above-mentioned groups of respondents. We calculate the marginal effects of the socioeconomic characteristics on this probability. For instance, it would be interesting to know if interviewees who abstain from answering questions about their inflation perceptions tend to have a lower educational attainment. After that, we investigate the socioeconomic determinants of short- and long-run inflation expectations also by means of interval regressions.

2 Empirical Results

We first discuss the results for inflation perceptions and then for inflation expectations.

2.1 Respondents' Inflation Perceptions Are Determined Mainly by Age, Educational Attainment, Income, Household Size and Place of Residence

In the OeNB-Barometer survey (IFES, 2013, question 13), people were asked to estimate or guess the annual rate of inflation for different periods of the past. More specifically, they were given the opportunity to choose from ranges of inflation rates in 1 percentage point intervals, from 0% to 5% (i.e. 0% to 1%, 1% to 2%, 2% to 3%, 4% to 5%) and above 5%. The respondents also had the option of a "don't know" answer. They were asked to estimate annual inflation for the following periods: (1) since the introduction of euro cash in 2002, (2) since the beginning of the financial and economic crisis in mid-2008, (3) the year 2012 and (4) the current month (depending on the time of the interview: March, April or May 2013).

The interval regressions are based on the following specification:

$$\begin{aligned} inf\,per = {} & \alpha+\beta_1 age+\beta_2 age^2+\beta_3 income+ \\ & +\beta_4 education+\beta_5 gender+ \\ & +\beta_6 agglomeration+\beta_7 housing+ \\ & +\beta_8 household\ size+ \\ & +\beta_9 emp\ status+\beta_{10} econ\ lit+ \\ & +\beta_{11} inf\ skept+\varepsilon \end{aligned} \qquad (2)$$

The estimation results are shown in table 2. Note that the coefficients of an interval regression (in contrast to the marginal effects presented in tables A1 and A2 in the annex) can be interpreted like OLS coefficients. They reveal that the respondent's age played a role in the choice of an inflation interval. The older the respondents were, the more

[8] *The alternative of probit regressions usually yields quite similar results because the cumulative distribution functions of the normal and logistic distribution are very similar.*

Table 2

Intervall Regressions
Dependent Variable: Inflation Perception in Different Periods

Variables	(1)	(2)	(3)	(4)
Age	0.0265*	0.0321***	0.0120	0.0153
	(0.0142)	(0.0117)	(0.0109)	(0.0133)
Age squared	−0.000212	−0.000257**	−0.000126	−0.000174
	(0.000140)	(0.000113)	(0.000104)	(0.000131)
Income	0.0484	−0.0383	−0.0970	−0.190**
3 groups	(0.0931)	(0.0725)	(0.0594)	(0.0755)
Education	−0.0316	−0.0753	−0.163***	−0.129***
3 groups	(0.0655)	(0.0512)	(0.0393)	(0.0500)
Gender	−0.0755	−0.00173	0.0251	0.0388
Dummy for male	(0.0995)	(0.0790)	(0.0690)	(0.0871)
Agglomeration (reference: below 5,000 inhabitants)	−0.0498	−0.195**	−0.284***	−0.137
above 5,000 inhabitants	(0.107)	(0.0813)	(0.0712)	(0.0883)
Housing	−0.151	0.179**	−0.0125	0.0598
Dummy for rented accommodation	(0.107)	(0.0816)	(0.0701)	(0.0886)
Household size (number of people)	0.00116	−0.0422	−0.0784**	−0.124***
	(0.0468)	(0.0344)	(0.0310)	(0.0370)
Employment status	0.0508	−0.187	0.106	0.260
Dummy for unemployed	(0.273)	(0.220)	(0.213)	(0.260)
Economic literacy	−0.164	−0.173**	−0.113*	−0.0971
Dummy for knowledge of price stability target	(0.101)	(0.0772)	(0.0656)	(0.0829)
Inflation skepticism	0.565***	0.248**	0.0583	−0.00222
Dummy if inflation (indicator) is deemed Unreliable	(0.140)	(0.0970)	(0.0836)	(0.0942)
Constant	2.322***	2.764***	3.557***	3.367***
	(0.375)	(0.300)	(0.287)	(0.359)
Observations	1,114	1,137	1,184	1,126

*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' calculations.

Note: Robust standard errors in parentheses.

(1) Since the introduction of euro cash in 2002.
(2) Since the beginning of the financial and economic crisis in mid-2008.
(3) In the year 2012.
(4) The most recent month (March, April or May 2013, depending on the date of the interview).

likely they were to opt for a higher inflation interval. It follows that older people tend to have higher inflation perceptions (evidence for this was also found in Hobijn and Lagakos, 2005, for U.S. households). Inflation perceptions increase by about 0.03 percentage points with every year of age. This feature is nonlinear and diminishes over time as captured by the negative coefficient on the term age squared. The nonlinear effect might be due to changing consumption patterns over the life cycle. More specifically, older people might consume more goods and services which record an above-average inflation rate during the respective periods (e.g. medical goods and services, restaurant services and fuels). As consumption patterns tend to consolidate with age, the described link of age with inflation perceptions is likely to diminish with age. However, the described effects were only significant for the period since the beginning of the financial and economic crisis and the period since the introduction of euro cash (in the latter case the nonlinear effect was not significant). Furthermore, people with higher income tend to have lower

inflation perceptions. Moving up one income group dampens inflation perceptions by 0.19 percentage points. Again, this feature did not apply to all periods considered, but only to the most recent month at the time of the interview. The link between education and inflation perceptions is robust for the most recent month and the year 2012: the higher the interviewees' educational attainment was, the lower were their inflation perceptions. The results for income and education are also likely to be largely ascribable to the specific consumption baskets of people with different income and educational attainment. In particular, as was shown in Fessler and Fritzer (2013) for Austrian households, higher-income groups and people with higher educational attainment tend to face lower actual inflation rates. Hence, differences in perceptions by and large seem to be congruent with actual inflation experiences.

In addition, people living in agglomerations differ in their inflation perceptions from people living in rural areas. People living in places with more than 5,000 inhabitants perceive inflation to be lower by 0.20 to 0.28 percentage points compared with those living in smaller residential areas. This characteristic was significant for the period since the introduction of euro cash and the year 2012. Inflation perceptions are not only influenced by actual price developments, but can also be affected by variables related to consumers' economic situation, e.g. disposable income or wages (see ECB, 2007). Hence, the inflation perceptions of people living in agglomerations could be dominated by higher-income groups.

The link between housing (rented accommodation or other types of accommodation) and perceptions of inflation is significant only for the period since the introduction of euro cash. More specifically, people living in rented accommodation tend to have relatively higher inflation perceptions than people owning their homes. This does not come as a surprise given that rent inflation had been higher than headline inflation for several years. Furthermore, compared with expenses for owner-occupied housing, rents are closer to frequent out-of-pocket expenditures, which are supposed to have a strong impact on inflation perceptions. However, the results are not significant for all periods. This broadly coincides with results found in Döhring and Mordonu (2007).

Besides the socioeconomic background investigated so far, household size also had an effect on the formation of perceptions. The larger the household was, the lower were inflation perceptions. This feature was significant for the year 2012 and the most recent month. A similar result was found by Fessler and Fritzer (2013) in the case of the link between actual inflation and household size: The larger the household is, the lower is the household-specific inflation rate. Household composition evidently has an influence on the household's consumption basket. More specifically, larger households (usually households with children) are more likely to be budget-constrained and therefore consume relatively more goods and services with below average inflation rates (e.g. clothing and footwear, recreation services and transportation) or are more prepared to substitute expensive products for cheaper ones when relative prices change. Furthermore, larger households more often live in self-owned accommodations (Statistics Austria, 2014), which might also dampen their inflation perceptions given that rents, which recently increased more than average inflation,

are not part of their monthly expenditures.

Economic literacy – here proxied by the respondents' knowledge of the quantitative definition of the Eurosystem's price stability target – affected inflation perceptions significantly for two periods considered (since the financial and economic crisis and for the year 2012). People who were informed about the price stability target had inflation perceptions that were, on average, lower by 0.11 to 0.17 percentage points. The indicator for inflation skepticism likewise influenced interviewees' inflation perceptions. The less convinced the respondents were about the reliability of the official inflation rates, the higher were their inflation perceptions. Inflation skeptics' perceptions were, on average, by 0.25 to 0.57 percentage points higher than those of non-skeptics. The considerable size of the impact might also have been partly driven by Austrian media. For instance, when the inflation rate of the basket of frequently bought products is higher than the overall measure of inflation, newspapers report about it. The opposite development does not usually make the headlines, though. Gender and employment status proved to be insignificant determinants of inflation perceptions for all periods considered.

Overall, a considerable share of the respondents did not provide an estimate or a guess of the inflation rate for different periods. Apparently this did not depend on any specific period about which respondents were asked. The lowest share of people responding "don't know" was recorded for the inflation rate in the year 2012 (24.5%), while for all other periods about 30% of the respondents were not able or willing to give an answer.

2.2 The Higher the Educational Attainment and the Better Informed Respondents Are about Economic Matters, the More Likely Perceptions Match the Actual Inflation Rate

Between one-fifth (for the period from 2002) and one-third (for the year 2012) of the people interviewed picked the correct interval, i.e. the range which contained the actual inflation rate during the respective period. Overall, respondents with a higher educational attainment are more likely to be well informed about the inflation rate in different periods (see table A1 in the annex). The marginal effects of educational attainment as well as of economic literacy on the probability to choose the correct interval were significant for all periods except the most recent month and the period since the introduction of euro cash. Put differently, people with higher educational attainment and those with knowledge about the quantitative price stability objective of the Eurosystem were more likely to choose the proper inflation interval. Other socioeconomic characteristics did not have a similar robust influence. In other words, the marginal effects were either insignificant, significant for fewer periods investigated or changed signs: Interviewees with higher income and males were more likely to pick the correct interval for the most recent month and for the period since the introduction of euro cash, respectively. In contrast, the marginal effects of inflation skepticism were ambiguous. For the period since the euro cash changeover, people who believed that the official inflation measure was not reliable were less likely to choose the correct inflation interval. Just the opposite was true for the most recent month.

2.3 How is Repsonse Abstention Distributed across Socioeconomic Groups?

The share of interviewees replying "don't know" when asked about the level of inflation, ranged from about one-fourth (for the year 2012) to almost one-third (for the period from 2002 and the most recent month). In particular, the younger the respondents were, the lower the income and the lower the educational attainment were, the more likely it was for respondents to refrain from stating an inflation rate for the different periods (see table A2 in the annex[9]). Furthermore, people with knowledge about the Eurosystem's price stability objective were more likely to answer the questions on inflation perceptions compared with those without this knowledge. Interestingly, also inflation skeptics were more likely to state their opinion on the inflation rate compared with non-skeptics. Finally, also females were more likely to be in the group of non-respondents compared with males.

2.4 Inflation Expectations Are Determined Mainly by Age, Gender, Education and Economic Literacy

Like perceptions of inflation, inflation expectations were also given in intervals in our dataset. Respondents were asked which inflation rate they expected to prevail in 12 months and 5 to 10 years ahead. They had to choose among 1 percentage point-wide intervals between –5% and +5%. In addition, two open intervals of below –5% and above +5% as well as the point interval of constant prices (0%) were also possible responses. Although the response structure of inflation expectations was slightly more complicated than that of inflation perceptions, the empirical strategy of estimating a generalized tobit model with maximum likelihood (interval regression) is still suitable. Thus, we estimate a model for short-term (1 year) and long-term (5 to 10 years) inflation expectations, where age, gender, income, education, a measure of economic literacy and a measure of the respondent's attitude toward the reliability of the official inflation indicator are the explanatory variables:[10]

$$\begin{aligned} inf\,exp = {} & \alpha+\beta_1 age+\beta_2 age^2+\beta_3 gender+ \\ & +\beta_4 income+\beta_5 education+ \\ & +\beta_6 econ\ lit+\beta_7 inf\,skept+\varepsilon \end{aligned} \qquad (3)$$

In the related literature (e.g. Bruine de Bruin et al., 2010), economic literacy was shown to significantly affect consumers' inflation expectations. Our proxy for economic literacy is the respondents' knowledge of the Eurosystem's quantitative definition of price stability, which is covered in a different question in the survey. About one-third (32.4%) of the respondents picked the correct answer of "below, but close to, 2%".[11] We use a dummy variable for the correct answer as a proxy for respondents' literacy in the field of inflation. As another dummy we include the declaration of respondents who find the Consumer Price Index (CPI) or the Harmonised Index of Consumer Prices

[9] *Note that the number of observations in table A2 is higher than in table 2 and table A1. The reason is that in the regressions reported in table 2 and table A1 the respondents that were not able or willing to decide on an inflation range were excluded, while the group of nonrespondents was included in the regressions of table A2.*

[10] *We tried out all the variables mentioned in equation (1), but included only those variables which proved to be significant in at least one of the two regressions in the final specification reported in this section.*

[11] *See Fluch et al. (2013) for a descriptive analysis of this and more results of the survey.*

(HICP) a "rather" or "fully unreliable inflation indicator". 14% of all respondents had this attitude toward the two official inflation indicators, which we interpret as inflation skepticism. We want to test the hypothesis whether being a skeptic with respect to the reliability of the official inflation indicator affects inflation expectations in a quantitative way.

The estimation results are shown in table 3. They indicate that – like in the case of inflation perceptions – both short-term and long-term inflation expectations are significantly affected by the respondents' age. Older respondents had significantly higher inflation expectations, with short-term expectations increasing by an average 0.03 percentage points and long-term expectations by 0.05 percentage points per year of age. This result is in line with the findings in the literature (e.g. Blanchflower and Mac Coille, 2009; Pfajfar and Santoro, 2008). Higher inflation expectations of older people are sometimes explained with their greater pessimism in general or their longer horizon of experience that also includes historical periods of elevated inflation, which could still affect their inflation expectations today. Like for inflation perceptions, we also find a nonlinear effect of the respondents' age on inflation expectations implying that the increase diminishes with higher age.

As in other studies, we find that women had higher inflation expectations than men. The gender effect is clearly significant for long-term expectations, but only borderline significant (with a p-value of slightly above 0.1) for short-term inflation expectations. Pfajfar and Santoro (2008) as well as Bruine de Bruin et al. (2010) explain gender differences in inflation expectations with women's stronger focus on day-to-day shopping. As prices of food and beverage items have been rising faster than the overall CPI in recent years, it is conceivable that primary shoppers of such items have higher inflation expectations.

Table 3

Intervall Regressions
Dependent Variable: Short- and Long-Term Inflation Expectations

Explanatory variables	1 year expectations	5 to 10 years expectations
Age	0.0345***	0.0472***
	(0.0115)	(0.0128)
Age squared	–0.0003**	–0.0004***
	(0.0001)	(0.0001)
Gender	–0.1232	–0.1698*
Dummy for male	(0.0773)	(0.0927)
Income	0.1242*	0.1414*
3 groups	(0.0635)	(0.0763)
Education	–0.0814*	–0.1731***
3 groups	(0.0495)	(0.0583)
Economic Literacy	–0.2128***	–0.2286**
Dummy for knowledge of price stability target	(0.0776)	(0.0938)
Inflation Skepticism	0.3276***	0.4094***
Dummy if inflation (indicator) is deemed unreliable	(0.0990)	(0.1220)
Constant	1.1585***	1.5030***
	(0.2686)	(0.3014)
Observations	1,261	1,186

Source: Authors' calculations.

*Note: *** p-value<0.01, ** p-value<0.05, * p-value<0.1; robust standard errors in parentheses.*

The finding that inflation expectations increase with respondents' personal income is somewhat at odds with the related literature.[12] Most studies, such as Menz and Poppitz (2013) and Bruine de Bruin et al. (2010), find significantly lower, rather than higher, inflation expectations for high-income groups. They explain this with group-specific inflation rates, where low-income groups are exposed to higher inflation rates due the higher proportion of food and energy items in their personal consumption basket. For Austria, Fessler and Fritzer (2013) have shown that income and group-specific inflation rates are negatively related, but differences across groups are numerically small. As a result, the effect of income on inflation expectations found for other countries could be muted in Austria.

For education, however, we do find the expected negative effect on inflation expectations: respondents with higher educational attainment (lower secondary, higher secondary, college/university) have significantly lower short- and long-run inflation expectations. Pfajfar and Santoro (2008) argue that agents with higher education are generally more interested in economic reports and specific information on inflation and other macroeconomic variables, which results in more realistic inflation expectations. They also note that income and educational groups are usually highly correlated in demographic studies, which explains the same sign of these two variables in regressions of inflation expectations. In our dataset, however, the correlation of income and educational groups is relatively small at 0.2, which could be another reason for the different effects of these two variables on expectations.[13]

According to Bruine de Bruin et al. (2010), financial literacy is the single most important factor explaining demographic heterogeneity in inflation expectations. They constructed a summary indicator from 16 questions on economic/financial literacy and found that people with a lower degree of financial literacy had significantly higher inflation expectations. Although our measure of economic literacy – a dummy for respondents' knowledge of the Eurosystem's definition of price stability – is much cruder than their measure, we also find a negative and strongly significant impact of economic literacy on inflation expectations.

Finally, our results also suggest that people who are skeptic about the reliability of the official inflation indicators have significantly higher short- and long-term inflation expectations than non-skeptics. The size of the coefficient indicates a very strong effect of this variable: inflation expectations of inflation skeptics are on average 0.3 percentage points higher in the short run than those of the rest of the population (0.4 percentage points in the long run). Interestingly, being an inflation skeptic is not correlated in any significant way with either educational attainment or economic literacy, but it nevertheless exerts a strong influence on the formation of inflation expectations.

[12] *The result in table 3 is based on a categorical income variable consisting of three income groups (with a monthly net income below EUR 1,050, between EUR 1,050 and EUR 2,100, and above EUR 2,100). Alternative estimations with a more finely defined income variable consisting of five groups deliver qualitatively equivalent results.*

[13] *This is not to say that education has no effect on people's income in Austria. Regular income reports of Statistics Austria document the positive effect of educational attainment on personal income. In that sense, our dataset might not be representative enough to capture the link between education and income in the population.*

To check the robustness of these results we also investigated the determinants of the qualitative inflation expectations available in our dataset. In addition to stating inflation expectations in quantitative intervals, respondents also had to indicate whether they expected prices (over the next 12 months and the next 5 to 10 years) to "increase strongly", "increase slightly", "remain constant", "decrease slightly" or "decrease strongly". We estimate an ordered probit model in which the resulting qualitative responses are regressed on the same explanatory variables as before. The ordered probit model is the equivalent to the interval regression when responses are given in ordered categories. The estimation results are presented in table A3 in the annex. Qualitatively, these results confirm our previous findings, yet significance is not always as strong as in the interval regressions: Age is only significant for short-run inflation expectations. Income as well as economic literacy are only significant for long-run expectations in the ordered probit models, but all other results are the same as before. Thus, qualitative and quantitative inflation expectations appear to be broadly consistent in our dataset. One advantage of the estimations with qualitative data is that they are based on more observations because fewer respondents drop out when asked about their qualitative inflation expectations compared with their quantitative expectations.

3 Summary and Conclusions

In this paper, we perform interval regressions to investigate the determinants of inflation perceptions and expectations in Austria. The analysis is based on data taken from a survey among 2,000 Austrian households, which was conducted in the second quarter of 2013. We find that people with a disadvantaged socioeconomic background perceive higher inflation rates. While the above-mentioned data source did not allow us to answer whether their perceptions are congruent with their own actual inflation experience, other studies argue that this is indeed the case. Furthermore, people with lower educational attainment, lower income and younger people are more likely to be unable to state perceptions of the development of inflation. It goes without saying that realistic perceptions of the general public about the actual inflation rate is an important factor for the credibility of a central bank. Hence, these results suggest that financial education strategies should be focused on population groups with less educational attainment and lower income as well as younger people.

We also find that older people, females and people with lower educational attainment have significantly higher short- as well as long-run inflation expectations. These results are in line with the existing literature. Furthermore, our simple measures of economic literacy and inflation skepticism also show a significant impact on inflation expectations: People who are better informed about economic matters tend to have lower and at the same time more realistic inflation expectations. A comparatively small share of inflation skeptics, i.e. people who do not regard the official CPI/HICP as a reliable inflation indicator, have considerably higher short- and long-run inflation expectations. This implies that economic and financial literacy initiatives by public organizations – like central banks and other institutions – will help improve the alignment of inflation expectations with actual developments. Intensifying such initiatives would therefore be a step toward supporting the effectiveness of monetary policy.

With time moving on, we will be able to evaluate the accuracy of the inflation expectations obtained from this survey. It will be interesting to investigate the factors explaining expectation errors or the probability that people have correct inflation expectations ex post. If inflation expectations and perceptions are biased upward, these might well be the same factors that determine the magnitude of expectations and perceptions in the first place. We leave this question for future research.

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Annex

Table A1

Logistic Regression of the Probability that Respondents Choose the Correct Inflation Interval

Variables	(1)	(2)	(3)	(4)
Age	−0.00124	−0.00613	0.00431	0.00380
	(0.00495)	(0.00499)	(0.00523)	(0.00538)
Age squared	0.00002	0.00008	−0.00002	−0.00002
	(0.00005)	(0.00005)	(0.00005)	(0.00005)
Income	−0.00765	−0.0376	−0.00526	0.0802***
3 groups	(0.0256)	(0.0270)	(0.0278)	(0.0290)
Education	0.0270	0.0630***	0.0684***	0.000978
3 groups	(0.0192)	(0.0196)	(0.0205)	(0.0215)
Gender	0.0650**	0.0172	−0.00139	−0.0587*
Dummy for male	(0.0309)	(0.0317)	(0.0327)	(0.0332)
Employment status	−0.0318	−0.0545	−0.0541	−0.125
Dummy for unemployed	(0.0789)	(0.0790)	(0.0757)	(0.0810)
Economic literacy	−0.0108	0.0586*	0.0875***	0.0369
Dummy for knowledge of price stability target	(0.0310)	(0.0313)	(0.0325)	(0.0336)
Inflation skepticism	−0.0884**	−0.0549	0.00203	0.115***
Dummy if inflation (indicator) is deemed unreliable	(0.0417)	(0.0424)	(0.0430)	(0.0441)
Observations	1,114	1,137	1,184	1,126

Source: Authors' calculations.

*Note: *** p<0.01, ** p<0.05, * p<0.1. The table reports marginal effects at the means. Standard errors in parentheses.*

(1) Since the introduction of euro cash in 2002.
(2) Since the beginning of the financial and economic crisis in mid-2008.
(3) In the year 2012.
(4) In the most recent month (March, April or May 2013, depending on the date of the interview).

Table A2

Logistic Regression of the Probability that Respondents Opt for the „Don't Know" Answer

Variables	(1)	(2)	(3)	(4)
Age	−0.00975***	−0.00791**	−0.00698**	−0.00356
	(0.00316)	(0.00311)	(0.00282)	(0.00348)
Age squared	0.00009***	0.00008**	0.00007**	0.00005
	(0.00003)	(0.00003)	(0.00003)	(0.00003)
Income	−0.0697***	−0.0643***	−0.0450**	−0.0371*
3 groups	(0.0207)	(0.0204)	(0.0182)	(0.0213)
Education	−0.0550***	−0.0460***	−0.0482***	−0.0302*
3 groups	(0.0166)	(0.0165)	(0.0149)	(0.0173)
Gender	−0.0634***	−0.0596***	−0.0576***	−0.0526**
Dummy for male	(0.0227)	(0.0222)	(0.0199)	(0.0239)
Employment status	0.0686	0.0578	−0.0374	−0.00582
Dummy for unemployed	(0.0458)	(0.0444)	(0.0446)	(0.0517)
Economic literacy	−0.175***	−0.162***	−0.174***	−0.187***
dummy for knowledge of price stability target	(0.0274)	(0.0268)	(0.0253)	(0.0279)
Inflation skepticism	−0.185***	−0.134***	−0.135***	−0.0874**
Dummy if inflation (indicator) is deemed unreliable	(0.0409)	(0.0390)	(0.0361)	(0.0361)
Observations	1,464	1,464	1,464	1,464

Source: Authors' calculations.

*Note: *** p<0.01, ** p<0.05, * p<0.1. The table reports marginal effects at the means. Standard errors in parentheses.*

(1) Since the introduction of euro cash in 2002.
(2) Since the beginning of the financial and economic crisis in mid-2008.
(3) In the year 2012.
(4) In the most recent month (March, April or May 2013 depending on the date of the interview).

Table A3

Ordered Probit on Qualitative Inflation Expectations Dependent Variable: Short- and Long-Term Inflation Expectations

Exlpanatory variables	1 year expectations	5 to 10 years expectations
Age	0.0189*	0.0091
	(0.0099)	(0.0110)
Age squared	−0.0002*	−0.0001
	(0.0001)	(0.0001)
Gender	−0.2015***	−0.1618**
Dummy for male	(0.0683)	(0.0696)
Income	0.0109	0.1020*
3 groups	(0.0536)	(0.0580)
Education	−0.0987**	−0.1615***
3 groups	(0.0403)	(0.0446)
Economic literacy	−0.0923	−0.1208*
Dummy for knowledge of price stability target	(0.0692)	(0.0698)
Inflation skepticism	0.3011***	0.2456**
Dummy if inflation (indicator) is deemed unreliable	(0.0932)	(0.0999)
Observations	1,424	1,364

Source: Authors' calculations.

*Note: *** p-value<0.01, ** p-value<0.05, * p-value<0.1; robust standard errors in parentheses. Dependent variables consist of 5 categories: [prices will…] increase strongly, increase slightly, remain constant, decrease slightly or decrease strongly.*

Definition of Variables

Below are the definitions of variables which are not self-explanatory.

Income:

Personal monthly net income

- low (below EUR 1,050),
- medium (EUR 1,050 to EUR 2,099),
- high (including and above EUR 2,100)

Education:

Highest level of successfully completed education

- lower secondary (compulsory school, apprenticeship, vocational school)
- higher secondary (high school)
- tertiary (university or college degree)

Agglomeration:

- below 5,000 inhabitants
- above 5,000 inhabitants

Housing:

Dummy with the value 1 for rented accommodation (including municipal and cooperative housing) and 0 for all other types of accommodation, e.g. owner-occupied housing and rent-free housing arrangements

Economic literacy:

Dummy to indicate respondents who correctly stated the Eurosystem's quantitative definition of price stability (below, but close to, 2%)

Inflation skepticism:

Dummy to indicate respondents who think that the official CPI or HICP are unreliable inflation indicators

Impact of Inflation on Fiscal Aggregates in Austria

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In Austria, temporary shocks to inflation (with unchanged real macroeconomic developments) impact the primary balance, i.e. the overall budget balance excluding interest payments, mainly via taxes and transfers whose brackets or rates are not indexed to inflation. Even though the overall effect of such shocks on budget balances would be very small in Austria, below-average inflation, for example, is still negative from a government's viewpoint because it significantly raises the public debt ratio. Lower inflation moreover depresses the gains made from both bracket creep and the devaluation of nominally fixed transfers, which is, however, somewhat compensated for by decreasing interest payments. Households, by contrast, benefit from lower inflation as it causes their net tax burden to go down.

JEL classification: E62, H60
Keywords: bracket creep, inflation indexation, Austria, social benefits

During the high-inflation periods of the 1970s and 1980s, the literature shedding light on the impact inflation has on public finances received considerable attention, but its importance has since diminished. Only recently – amid low and in some countries even negative inflation – has this topic attracted renewed attention. In 2014, an ESCB project team consisting of experts from the ECB and the national central banks (NCBs) of Austria, France, Germany, Greece and Italy started to analyze the effects of low and negative inflation on fiscal variables, and the European Commission organized a workshop on this topic in early 2015.[2]

Inflation has been shown to impact fiscal variables in a number of ways (compare Tanzi et al., 1987), namely (1) primary deficits via its effects on government revenues and current expenditures, (2) interest payments via its effects on nominal and real interest rates, and (3) in addition to these effects, debt ratios are affected via the denominator effect.

The effects of inflation on fiscal variables vary from country to country, because they heavily depend on the institutional setting, such as the tax system, the wage-setting process or expenditure requirements. To assess the overall importance of inflation for fiscal variables, fiscal sustainability and a country's ability to comply with the requirements of the Stability and Growth Pact[3], it is therefore necessary to understand the country-specific channels. This paper focuses on the impact of inflation on fiscal variables for given real macroeconomic developments. For this reason, we can neglect the question whether lower inflation is supply or demand driven.

The ESCB project team (later cited as Attinasi et al., 2015) analyzed the inflation impact on fiscal variables for Austria, France, Germany, Greece and Italy. The experts from the ECB and

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[2] *ECFIN Workshop "9th Meeting of the Network of Public Finance Economists in Public Administration," Brussels, February 10, 2015. Session II was dedicated to "Does Inflation Matter? Fiscal Consolidation Strategies and Debt Reduction in a Low Inflation Environment."*

[3] *In this context, it is important to stress that it is not part of the mandate of the Eurosystem to set its inflation target with a view to improving the fiscal sustainability of the euro area Member States.*

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ECB

the NCBs of the countries focused on harmonized synthetic simulations to quantify the overall deficit and debt impact as well as fiscal sustainability issues. Drawing on the results from this ESCB project, we elaborate on them by zeroing in on Austria and by explaining in detail the most important channels for Austria. Moreover, we go beyond the purely macroeconomic focus by providing some microeconomic insights for Austria, putting the current status quo into perspective.

This paper is structured as follows: In section 1, we discuss, along the lines of the literature, the impact of inflation on tax revenues in Austria. We present the main features of the Austrian tax and social security systems, examine implications for government budgets, but also highlight the impact inflation has on individuals. In section 2, we analyze the effect of inflation on primary expenditure, again taking into account the impact on individuals. Section 3 completes the analysis as we look at the sensitivity of debt and debt servicing costs to inflation developments, and section 4 sums up and concludes.

1 The Effect of Inflation on Tax Revenue

As indicated above, a change in inflation may considerably impact the revenue side of the government budget. As long as taxes and social security contributions are levied proportionally based on transactions at current prices, tax revenues will change in line with inflation and will thus stay constant in real terms. In progressive tax systems, tax revenues will increase by more than inflation; this means that even real tax revenues increase thanks to inflation. If taxation is based on quantities or historical tax bases, nominal tax revenues are not affected by inflation developments; yet, inflation erodes the real value of tax revenues.

The literature also points to the importance of inflation-induced revenue losses due to collection lags (e.g. Immervoll, 2005), which denote the period between the time a tax liability arises and the actual collection of the tax. In case of long collection delays, the loss of real tax revenue might be sizeable (Olivera-Tanzi effect). However, in most modern economies both the importance and the size of the Olivera-Tanzi effect have been reduced, because collection lags have decreased thanks to information and communication technology and remaining lags are corrected by tax prepayments. Interest payments on tax arrears and moderate inflation rates have likewise played a role.

Seigniorage is another inflation-dependent revenue source often referred to in the literature. As summarized in Attinasi et al. (2015), it represents central banks' operating profit distributed to governments (for more details, see Buiter, 2007). However, seigniorage accounts for a very small percentage of government revenues in industrialized countries, which is why we neglect the impact of inflation on seigniorage revenues.

1.1 Lower Inflation Would Have Little Impact on Real Revenue from Social Contributions[4]

Social security contributions are generally levied proportionally based on personal income. As they can be interpreted as insurance, where the risk does not rise with income, several EU Member States have introduced caps on

[4] *In the following subsections, we explain the general impact of inflation on different revenue categories; the subheadings, however, refer to the effect of below-average inflation (in line with the main topic of this paper).*

social security contributions. To prevent (real and inflation-induced) wage increases from pushing more and more people over these limits, which would exempt a growing share of their income from contributions, countries generally adopt laws stipulating that such caps be indexed to inflation. Austria adjusts the caps (and the minimum contribution levels as well as the tax brackets for the partly progressive unemployment insurance contribution[5]) in line with average wage increases in *t–2*[6]. These adjustments keep real social security contributions stable.

1.2 Progressive Personal Income Taxes Would Be Dampened by Lower Inflation

Growth of average personal income (and pensions) may lead to a more than proportional rise in personal income tax revenues, a phenomenon referred to as fiscal drag. Fiscal drag is the result of a progressive tax system, where individuals end up in higher tax brackets and hence pay higher marginal income tax rates once their wages and salaries increase. This so-called bracket creep may be due to (1) increases in real wages, (2) increases in nominal wages intended to compensate for inflation or (3) a mixture of both. Inflation-induced bracket creep, also referred to as inflationary fiscal drag ("kalte Progression" in German), entails a higher tax burden and declining real after-tax incomes. Higher tax revenues due to inflationary fiscal drag are arguably of greater concern than bracket creep due to higher real wages – real fiscal drag – as the latter follows the "ability to pay"[7] principle. In a progressive tax system, the average tax burden increases with rising income also for those who do not move into the next tax bracket, because a greater proportion of their taxable income is taxed at the higher marginal rate.

Moreover, fiscal drag arises as inflation erodes the real value of nominally fixed allowances and tax credits such as the general tax credit for employees ("Arbeitnehmerabsetzbetrag"). Given that tax expenditures often aim at raising the disposable income of vulnerable groups, these groups may suffer disproportionally from inflation.

Several approaches could be used to prevent the unwanted effects of inflation, such as reducing tax rates when the general price level increases, or inflation indexing, i.e. continually adjusting tax brackets and tax expenditures for inflation.[8] However, in the EU, the most widely used approach is the discretionary adjustment of tax brackets at irregular intervals – what is often labeled as income tax reliefs. Between such irregular adjustments policy makers have the opportunity to finance additional expenditures. Indeed, none of the five Member States analyzed in the ESCB project (Attinasi et al., 2015) currently adjusts tax brackets or tax expenditures both regularly and automatically.

[5] *A flat unemployment insurance contribution rate of 3% is generally applied to employees, but up to certain monthly incomes lower rates are charged on the whole wage income, namely 0% (up to a monthly income of EUR 1,246), 1% (up to EUR 1,359) and 2% (up to EUR 1,530). The threshold amounts are adjusted annually; the amounts indicated here refer to 2014.*

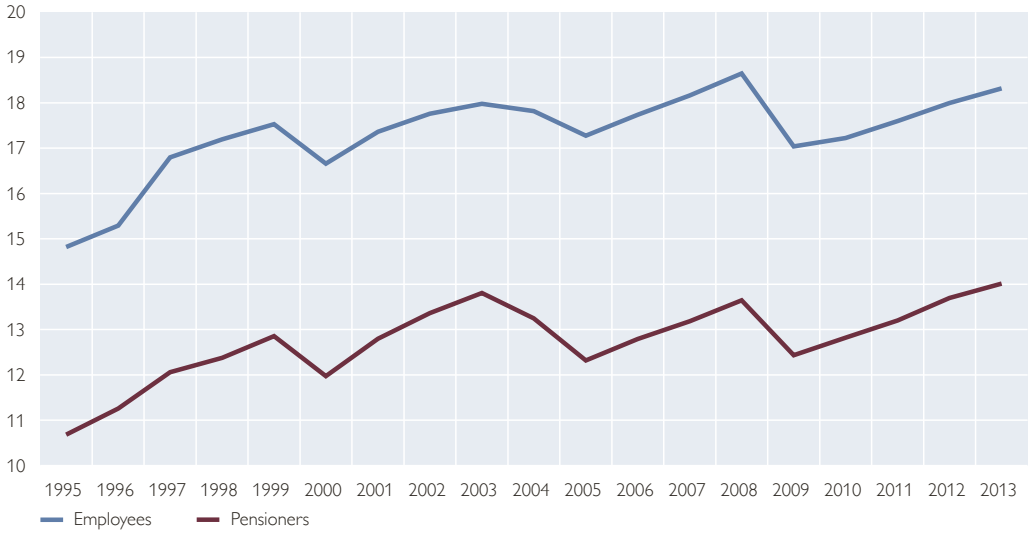
[6] *To be precise, according to §108 of the General Social Security Act (ASVG), these different bases are adjusted by the nominal growth rate of the average base for pension insurance contributions in t–2.*

[7] *While not undisputed, the ability-to-pay principle in taxation indicates that taxes should be levied according to taxpayers' economic capacity (i.e. ability to pay), which justifies progressive income tax systems.*

[8] *For further approaches, see Immervoll (2005, p. 4f).*

Chart 1

Income Tax Withheld from Wages and Pensions in Austria



Source: Statistics Austria (wage tax statistics from 1995 to 2013).

Austria's personal income tax system is progressive and currently employs four income tax brackets, with the rates ranging from 0% to 50%.[9] Reduced (less progressive) tax rates apply to the 13th and 14th monthly salary. As of early 2015, none of the important parameters (tax brackets, allowances) in the Austrian income tax system is automatically indexed to inflation or wage developments.[10] Non-adjustment of these parameters has contributed significantly to fiscal consolidation in Austria over the last two decades.

Since 1995, three relatively large tax cuts (in 2000, 2004/2005 and 2009) more than compensated, in nominal terms, for the effect of two consolidation packages (in 1996/1997 and 2001) that had included significant wage income tax measures. However, the real decline in tax brackets, tax credits and allowances (examples of the latter two are shown in chart 2) led to a substantial increase in implicit wage tax rates[11] over this time horizon. This is illustrated by chart 1, which shows separate figures for employees and pensioners.

This fiscal drag creates significant room for maneuver for the government.[12] None of the post-2009 consolidation packages included an explicit major (i.e. with an impact of more than 0.1% of GDP) measure on the wage income tax. Nevertheless, revenue from this tax increased much more strongly than its bases (chart 1) or than trend GDP and hence contributed signifi-

[9] *The Austrian federal government recently agreed on a tax reform which would increase the number of tax brackets to seven, ranging from 0% to 55%.*

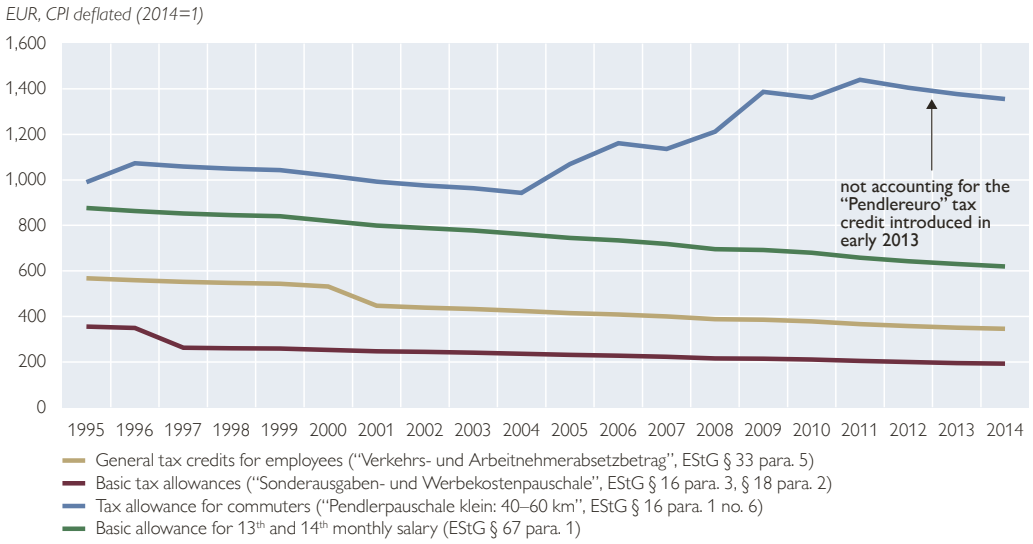
[10] *However, taxable income is adjusted to the extent to which tax-deductible social security contributions are raised in line with inflation.*

[11] *Here the implicit tax rate is defined as personal income tax revenues divided by gross earnings without social security contributions.*

[12] *The extent of this fiscal drag is also reflected in the elasticities of the personal income tax with regard to its base variables. In the OeNB fiscal projection model (see Prammer and Reiss, 2014), a 1% increase in average wages (average pensions) leads to a 1.8% (2.05%) increase in the revenue from personal income tax on wages (pensions).*

Chart 2

Development of Different Parameters of Austria's Income Tax System in Real Terms

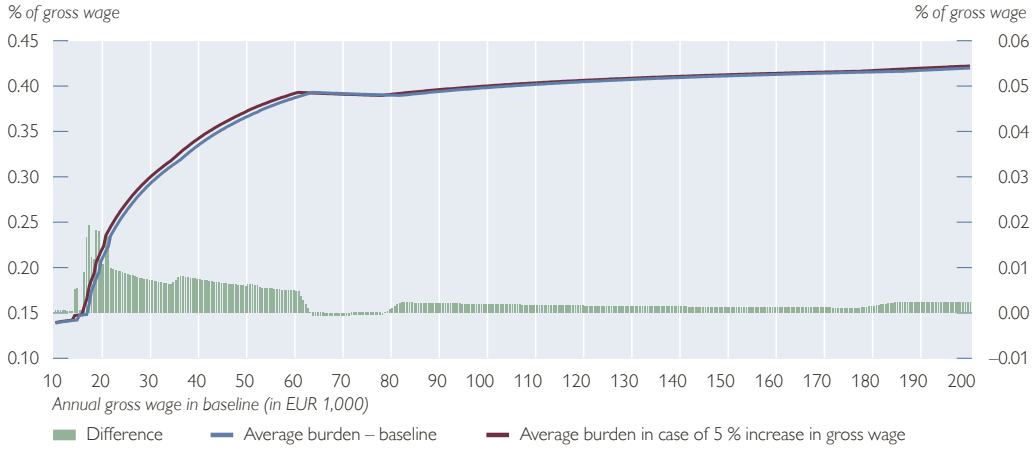


Source: Austrian Federal Chancellery, Statistics Austria, OeNB.

Note: EStG refers to the Einkommenssteuergesetz (Austrian Income Tax Act).

Chart 3

Average Burden on Employees from Social Contributions and Wage income Tax



Source: OeNB.

Note: Assumptions: White-collar worker, member of the Austrian Chamber of Labour, no additional deductions, based on 2014 tax Laws. For simplicity, indexed parameters (e.g. the maximum base) are not adjusted in the 5% increase wage scenario. The simulation is based on 2014 values (for tax brackets etc.).

cantly to the improvement of the Austrian structural balance (of more than ¾% of GDP by end-2014). This room for maneuver has also, to a small extent, been used to increase allowances for commuters (chart 2).

What does this imply for average tax rates? Earners of lower to middle incomes are hit hardest by these policies as the difference between the average and the marginal tax rate is largest for them (chart 3).

The way changes in inflation impact the revenue from personal income taxes depends on whether such changes originate from wage developments and, if not, how fast they translate into changes in wages.

1.3 Effective Real Corporate and Capital Gains Tax Rates Decrease with Lower Inflation

In general, the EU Member States apply proportional standard corporate income tax rates; sometimes with deviating rates for low/high profits or special sectors and regions. Overall, corporate income taxes are far less progressive than personal income taxes, given their smaller number of tax brackets. The Austrian corporate income tax is strictly proportional, with a standard corporate tax rate of 25%. However, even if corporate profits are taxed proportionally, inflation does play a role. Depreciation allowances, which reduce corporate profits, are usually based on historical nominal costs, i.e. the price that was paid when the investment was made. By reducing the real value of depreciation allowances, inflation, thus, indirectly increases the effective corporate tax rate.

In the same vein, the effective tax rate on capital gains (e.g. interest income or dividends) increases with inflation, as these taxes are, generally, levied on nominal bases. In other words, inflation erodes the real value of capital gains. In Austria, capital gains are taxed at a flat rate of 25%. Assuming an asset was bought at EUR 100 and sold at EUR 110, the capital gain of EUR 10 would hence be subject to a tax of EUR 2.5. At an inflation rate of 2%, the real capital gain would only equal EUR 8 and the real effective tax rate would amount to 31.25%. Real effective tax rates can easily go far beyond 100% if inflation comes close to (or even exceeds) the nominal capital gain. For capital gains on real estate property, by contrast, inflation developments may currently be taken into account. If the property is sold more than ten years after the purchase, inflation developments from the tenth year onward can be used to deflate nominal capital gains. Gains made over the first ten years are taxed on a nominal basis, however.

1.4 Revenues on Excise Duties Would Erode Less with Lower Inflation

Most revenue from other (mainly indirect) taxes in the EU comes from taxes which are levied proportionally on an ad valorem basis; i.e. they are levied as a percentage of the transaction value at the time of the transaction, such as the VAT. Hence, such a tax changes in line with the nominal value of the underlying tax base and the real value of the tax remains unchanged irrespective of inflation.

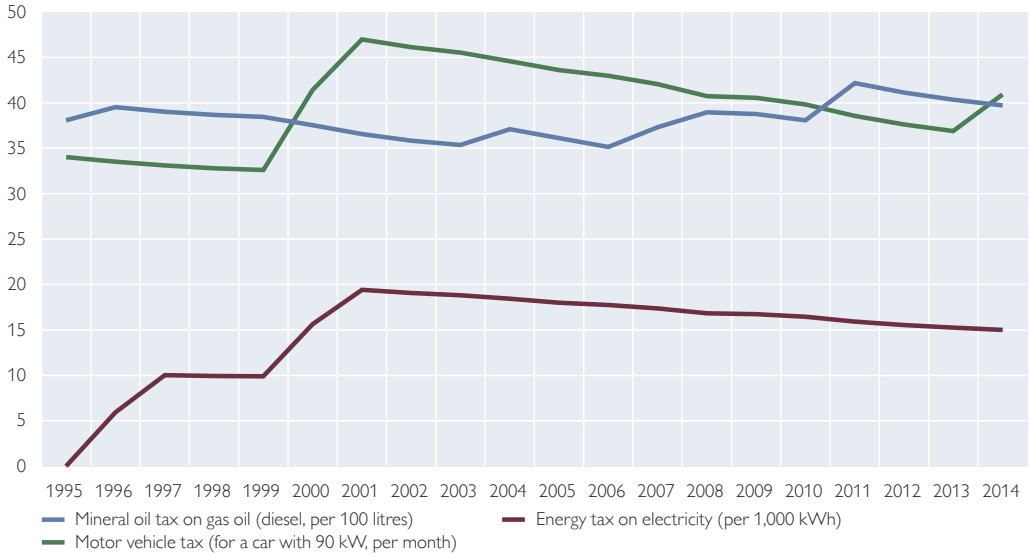
Excise duties are a major exception to the ad valorem basis, as they are mostly levied proportionally to quantities. These taxes comprise mineral oil and energy taxes, alcohol and tobacco taxes[13] as well as motor vehicle taxes, which are all levied on the quantity acquired, e.g. liters in the case of mineral oil taxes or kW in the case of motor vehicle taxes. Thus, price developments should not affect nominal excise tax revenues. Yet in real terms, these tax revenues tend to gradually erode with inflation. Moreover, tax revenues that

[13] *To be precise, the base for the tobacco tax is partly ad valorem. However, we allocated it to the taxes with nominally fixed rates as (due to the very high implicit tax rates on tobacco) the ad valorem part is mainly levied on the nominally fixed part of the tax.*

Chart 4

Rates of Selected "Consumption-Related" Taxes in Austria in Real Terms

EUR, CPI deflated (2014=1)

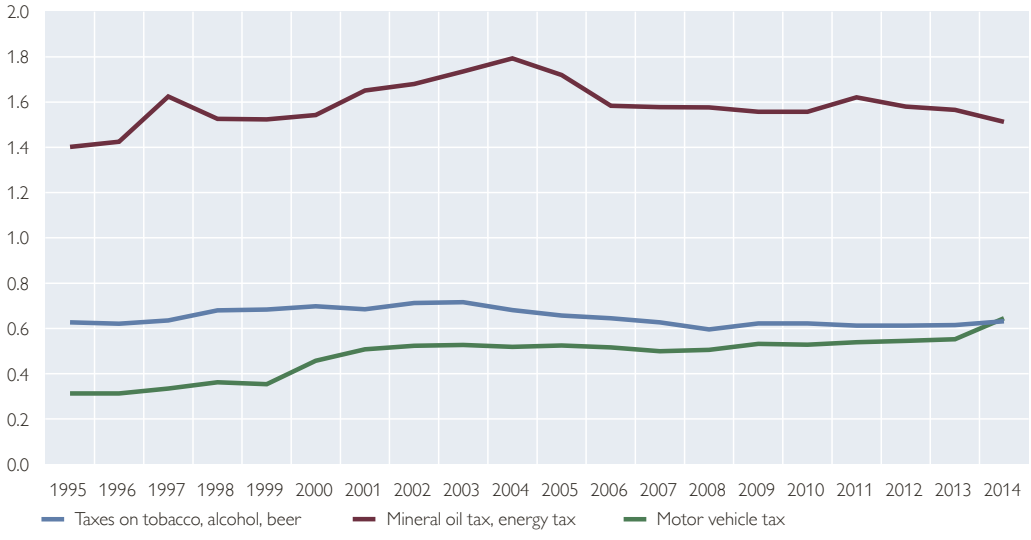


Source: Austrian Federal Chancellery, Statistics Austria, OeNB.

Chart 5

Revenue from Nominally Fixed "Consumption-Related" Taxes in Austria

% of GDP



Source: Statistics Austria, Austrian Federal Ministry of Finance.

are levied on fixed nominal values, such as recurrent property taxes in Austria, are also eroded by inflation.

In Austria, taxes that do not respond automatically to any price developments make up around 3% of GDP. When we use the methodology applied in Attinasi et al. (2015), the fiscal drag for indirect taxes not subject to mandatory inflation indexation in Austria – i.e. the real revenue loss – amounts to 0.03% of GDP per 1% inflation.

In fact, the mineral oil tax and especially the tobacco tax have been adjusted regularly in Austria; increases in the latter were part of virtually every consolidation package over the last two decades. Adjustments of nominal tax rates for other "consumption-related" taxes like the motor vehicle tax ("motorbezogene Versicherungssteuer"), other energy taxes ("Energieabgaben"), the alcohol tax and the beer tax have been rare, but in part relatively large. For example, the rates of both the energy tax for electricity and the motor vehicle tax were adjusted only once between 1997 and 2013: in 2000, they were increased by about 100% and 50%, respectively (chart 4). Note, however, that a comparison of the developments of the motor vehicle tax[14] and the tobacco tax (plus the small taxes on alcohol and beer) shows that trends in household behavior partly compensate for the developments of real tax rates (chart 5).

2 The Effect of Inflation on Primary Expenditure

Inflation affects expenditure via different channels, which will be analyzed in detail in this section. A large share of entitlement spending, in particular pension benefits, is indexed to inflation developments, while some smaller lump-sum social benefits are not indexed. Public wages are de facto linked to past inflation. Other primary expenditure categories are mainly driven by enterprises classified under government as well as state and local governments; therefore it is quite hard to estimate how fast lower inflation would pass through to them.

2.1 Pensions (de jure) and Public Wages (de facto) Are (Directly) Linked to (Past) Inflation

In Austria, the most important expenditure categories that are, under current law, indexed to past inflation developments are pension benefits. Inflation developments also play a role for expenditure on public employees, albeit not automatically, but via the wage-setting process. Adjustment relies on past realized inflation rates, however, and not on current or projected inflation rates. The effect of a temporary decrease of the inflation rate by 1 percentage point on nominal spending on these items is therefore negligible on impact. It only feeds through with a significant time lag, reducing government expenditure.

In principle, public pensions (social security pensions and pensions for retired civil servants) should be adjusted annually with the so-called adjustment factor, which itself is based on lagged inflation.[15] This is not always the case, though. In recent years, the average adjustment was several times below past inflation, especially in 2013 and 2014 (as part of the consolidation package of 2012), and the rate of nominal increase tended to be higher for lower pensions. However, there has not been any nominal pension freeze recently. Means-tested social (inclusion) benefits are also adjusted with the adjustment factor. Unemployment benefits are granted based on the unemployed person's past earnings.[16] So, similar to pen-

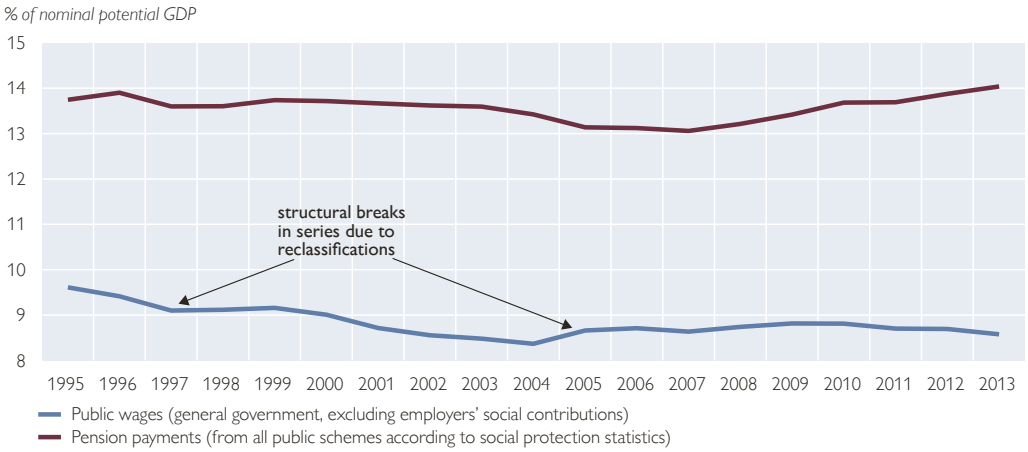
[14] *In early 2014, the motor vehicle tax was increased again (which is also indicated in charts 4 and 5).*

[15] *The General Social Security Act (§108 ASVG) states that increases in pensions should in principle be based on the so-called adjustment factor, which in year t equals the arithmetic average of year-on-year CPI inflation rates from August t–2 to July t–1.*

[16] *According to the Unemployment Insurance Act (AlVG), unemployment benefits are granted in relation to wages of t–2 if claimed in the first half-year t, and in relation to wages of t–1 otherwise (§21 AlVG). Unemployment benefits based on wages of t–2 are adjusted by the adjustment factor.*

Chart 6

Expenditure on Public Wages and Pensions in Austria



Source: Austrian Federal Ministry of Labour, Social Affairs and Consumer Protection, Eurostat, European Commission.

sions and public wages, overall payments on unemployment benefits react with some lag to price and wage developments.

In Austria, public wages are not legally indexed to inflation. Public-sector wage increases are determined by negotiations between trade unions and the respective minister. While, in general, trade unions negotiate for wage increases taking into account (usually past CPI) inflation and productivity gains, the actual wage increase reflects much more than that, namely e.g. the specific economic situation and consolidation needs. Hence, there is undoubtedly some, yet no one-to-one, relation between inflation and wage increases in Austria.

Chart 6 shows the development of public wages and pensions since 1995. In the absence of restrictive policy measures, pension expenditure tends to increase more strongly than trend GDP in times of stable inflation. In years with decreasing inflation, the ratio of spending on these items to nominal potential (trend) GDP[17,18] advances faster than usual (e.g. in 2009[19]), while it increases more slowly if inflation rises (e.g. in 2011). Therefore, years with sizeable restrictive measures on public wages and pensions are sometimes hard to detect when only looking at macro data. For example, in 2013, pensions were indexed 1 percentage point below past inflation, and (based on figures from Statistics Austria) the number of pensioners increased less than in the years before. Expenditure on pensions nevertheless grew at a considerably faster pace than nominal potential GDP (chart 6), as inflation in 2013 was significantly lower than in 2011 and 2012.

[17] *Nominal potential GDP is computed by multiplying smoothed real GDP (in this case the trend is calculated via the production function approach of the European Commission) with the GDP deflator. Therefore, nominal potential (trend) GDP will tend to increase more strongly in times of high inflation, as the price component is not smoothed.*

[18] *These expenditure aggregates are divided by (nominal) potential GDP as they are presumably less cyclical than the revenue aggregates in chart 5 (especially the mineral oil tax).*

[19] *With regard to the rise in pension spending, the expansive measures of 2009 (especially the indexation above past inflation) and the large increase in the number of pensioners should have been roughly compensated for by the phase-out of one-off measures taken in 2008.*

2.2 Lump-Sum Family and Long-Term Care Benefits are Nominally Fixed and Not Indexed to Inflation

Other social transfers such as federal lump-sum family benefits and lump-sum long-term care benefits are not indexed to inflation. Hence, their real value erodes over time in the absence of discretionary adjustment.

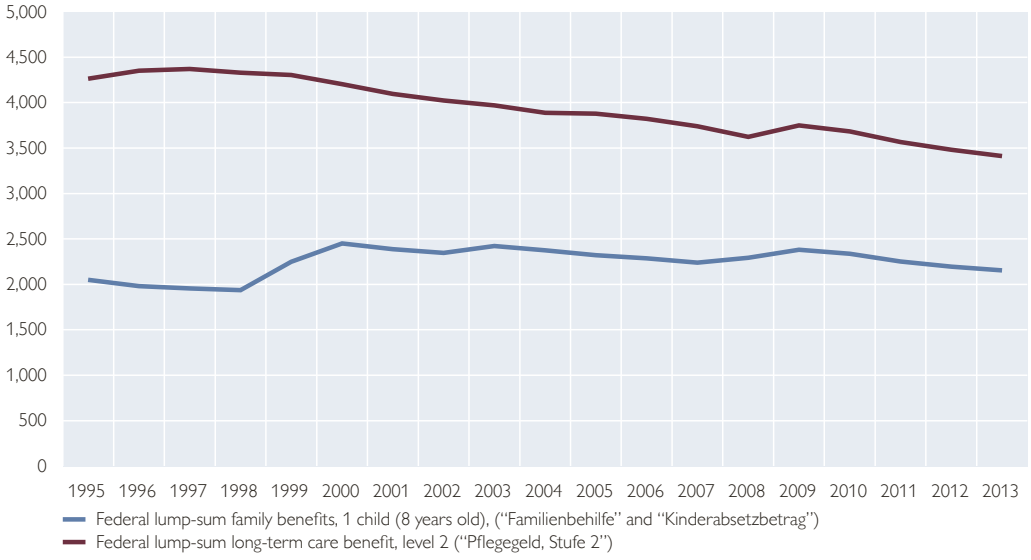
Chart 7 indicates that nominal adjustments of the most important federal lump-sum family benefits[20] tend to be irregular (with almost all adjustments being increases). However, some of these adjustments (especially in 1999/2000 and 2008/2009) were quite substantial, which is why these benefits tend to be somewhat higher in real terms than in the mid-1990s.[21] This cannot be said of lump-sum long-term care benefits ("Pflegegeld"), however. Because these benefits have only seen one sizeable increase since their introduction in the mid-1990s,[22] their value has significantly declined in real terms.

Chart 8 indicates that expenditures on these items are also driven by demographic developments given that overall population growth exceeds that of recipients of family benefits, while trailing that of recipients of long-term care benefits. So, despite a significant real decline in rates (and some tightening of eligibility), the ratio of spending on long-term care benefits has remained roughly stable since 1997.

Chart 7

Annual Entitlement to Selected Family and Long-Term Care Benefits in Austria

EUR, CPI deflated (2013=1)



Source: Austrian Federal Chancellery, Statistics Austria, OeNB.

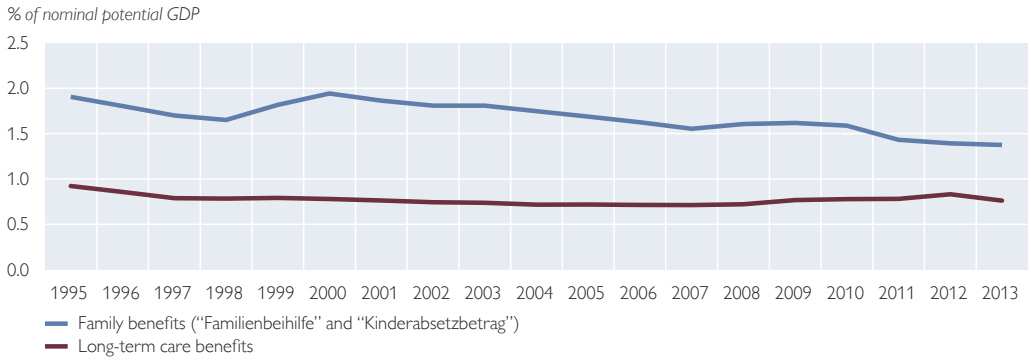
[20] *Note that there are also some other child-related cash benefits in Austria, above all the child-care benefit ("Kinderbetreuungsgeld"). However, the family allowance ("Familienbeihilfe") and the child tax credit ("Kinderabsetzbetrag") are the only major lump-sum, not means-tested family benefits in cash that have been in place since at least 1995.*

[21] *Eligibility for university-level students was tightened over this time span, however.*

[22] *In addition, eligibility for these benefits has also been tightened somewhat over the last 20 years. The trend for the other six levels of the long-term care benefit ("Pflegegeld") is similar.*

Chart 8

Expenditure on Selected Nominally Fixed Cash Social Benefits in Austria



Source: Austrian Federal Ministry of Labour, Social Affairs and Consumer Protection, Eurostat, European Commission.

Nonadjustment of these transfers creates significant savings for the government, but is likely to hit lower- to middle-income households most, because these transfers make up a relatively higher share of their disposable income.

2.3 Most other Primary Expenditures and Non-Tax Revenues Should Respond rather Quickly to Changes in Inflation

Social benefits in kind provided via market producers consist mainly of entitlement spending related to health care (e.g. outpatient services, pharmaceuticals). Consequently, a change in prices charged within the private sector should translate rather quickly into nominal spending on these items.

Most other primary expenditures (other than wages and social benefits) as well as most non-tax revenues are driven by entities other than core central government (and social security funds), namely by regional and local government and by extra-budgetary units classified under government (e.g. subsidiaries of the Austrian Federal Railways (ÖBB) holding company, state hospitals, universities, theaters and museums). Estimating the possible impact of changes in inflation is therefore difficult. Furthermore, these remaining items are dominated by spending and revenue directly related to the value of goods and services, namely spending on intermediate consumption and investment as well as the proceeds from market or non-market output.[23] Therefore, it may be plausible to assume that changes in inflation translate relatively quickly into the nominal value of these revenue and expenditure items.

3 The Effect of Inflation on Debt and (Net) Interest Payments

Changing inflation rates also impact on government debt and the related interest payments.

3.1 The Effect on Interest Expenditures Depends on the Size of the Fisher Effect and the Debt Structure

The extent to which inflation affects interest payments depends on the nature of the inflationary shock, the pass-through of inflation to nominal interest rates and the size and composition of government debt.

[23] *Also, note that fees for municipal services (which are part of the proceeds from market or non-market output as well as property income) tend to be regularly adjusted for inflation.*

Most importantly, one has to take into account that Austria is a euro area member, and that a country-specific inflation shock would only have a negligible impact on euro area inflation and, hence, interest rates. A full Fisher effect (in case of a euro-area-wide shock) would assume a one-to-one pass-through of inflation to nominal interest rates. This is, however, a very unlikely assumption in case the fall in inflation is only temporary and/or if interest rates were already very low before. The composition of government debt is important as it determines which part of interest liabilities are affected by changed nominal interest rates. The more non-maturing, fixed interest-rate home currency debt is held (and the lower the deficit), the less interest payments are exposed to changes in interest rates in the short run.

In Austria, cash deficits and variable interest-rate debt tend to be small compared to overall debt. Furthermore, the average residual maturity of the core central government debt (which constitutes about three-quarters of overall debt) is above eight years. Hence, Austria's interest expenditure remains relatively unaffected by temporary changes of interest rates (and thus also by inflation rates).

3.2 In the Short to Medium Run, Lower Inflation Tends to Raise the Debt Ratio

Given that debt in year t is influenced by the budget balance in t, it follows that debt is affected by inflation developments. As analyzed above, the exact impact of inflation on public debt depends on the indexation mechanisms of revenues and expenditures for the primary balance and the composition of public debt for interest payments.

More importantly, the debt ratio is particularly affected by inflation via the development in the denominator, namely nominal GDP. As mentioned before, the impact of lower inflation on interest payments is rather muted in Austria. Even in the (unlikely) case of a full Fisher effect, the change in the denominator would dominate in the short run.

This is corroborated by simulations in Attinasi et al. (2015), where a drop in the inflation rate by 1 percentage point would, in the first year, raise the Austrian debt ratio by 0.7 percentage points.[24] Debt sustainability analysis in the same paper showed that a temporary shock to inflation reducing its growth by 1 percentage point for three years[25] would cause the Austrian debt ratio to increase by 5.7% of GDP over a period of ten years.

4 Overall Effects of Inflation on the Fiscal Deficit and on Debt

In the analysis of Attinasi et al. (2015), revenues in Austria respond somewhat faster to inflation changes than current expenditure.[26] The initial impact of a 1 percentage point decrease in inflation on the primary balance is negative, but fades out after two to three years. Assuming that reduced inflation passes (to some extent) through to lower nom-

[24] *These results assume a partial Fisher effect of 0.6, and are based on the debt ratio for 2013 as presented in the March 2014 notification (which was still drawn up according to ESA 95).*

[25] *The analysis is based on a temporary shock lowering GDP deflator growth by 1 percentage point for three years (2015–2017), followed by gradual linear convergence over the subsequent five years (2018–2022) to the path in the benchmark (reaching GDP deflator growth of the benchmark in 2022).*

[26] *To draw conclusions on the overall implications for the government deficit and debt, the authors had to make assumptions on how fast lower inflation passes through to private wages as well as other primary expenditure and non-tax revenue.*

inal interest rates (Fisher effect), the positive effects of reduced interest payments almost balance out the negative effects of lower inflation on the primary balance and result in small effects on the deficit ratio in Austria. This is in line with the results for the other euro area member countries analyzed in Attinasi et al. (2015), although the dynamics of the effects vary due to different institutionalization and indexation mechanisms. While Germany and Austria display a diminishing impact on the deficit ratio, in France and Greece the impact builds up in the second and third year after the inflationary shock. This is mainly due to the fact that in France and Greece public wages do not adjust to lower inflation, as their wage indexation mechanisms have been suspended. As indicated above, the impact on the debt ratio is considerably larger, particularly via the denominator effect. The size of the effect also depends on the debt level and the debt structure and refinancing requirements. Among the countries analyzed in Attinasi et al. (2015), the short-term impact on the debt ratio is highest in Italy. This is due to Italy's high debt ratio and relatively low share of short-term and variable interest rate debt. In, Greece, the high share of variable and short-debt debt (about 80%) allows this country to benefit immediately from falling interest rates. Hence the impact of lower inflation on the debt to GDP ratio is less pronounced than in Italy, despite a higher debt ratio.

For temporary negative inflation, the effects on the public deficit and on debt are not clear. In the short term, nominal downward rigidity of wages, social benefits and nominal interest rates would be very likely. Hence, while revenues may be sustained due to nominal wage rigidity (and the high share of labor taxes in overall tax reve-

Table 1

Structure of Government Revenue and Primary Expenditure in Austria

	2013 *% of GDP*	Explanatory notes	Permanent effect of 1% drop in price deflator on ratio to GDP
Taxes on income	12.7		
of which wage income tax	8.0	brackets, allowances and tax credits are nominally fixed and not indexed to inflation	–0.08
of which personal income tax	1.3		
Other taxes	15.2		
of which excise duties	2.3	rates mostly nominally fixed, not indexed to inflation	
of which motor vehicle tax	0.6	rates nominally fixed, not indexed to inflation	0.03
of which land tax	0.2		
Social contributions	15.3		
Other revenue	6.2		
Social benefits other than in kind	19.2		
of which pension benefits	~14	indexed on past CPI (average of August t–2 to July t–1)	
of which unemployment benefits	~1¼		
of which long-term care benefits	~¾	rates nominally fixed, not indexed to inflation	0.03
of which family benefits	~2	rates mostly nominally fixed, not indexed to inflation	
of which other	~1		
Expenditure on personnel	11.1		
of which wages	8.6	negotiations take past CPI into account	
of which employers' social contributions and payroll taxes	2.4		
Social benefits in kind (via market producers)	3.8		
Other primary spending	14.3		

Source: Statistics Austria, Austrian Federal Chancellery, Austrian Federal Ministry of Labour, Social Affairs and Consumer Protection, OeNB.

nue), real expenditure also increases. The exact effect on the deficit depends – as with lower inflation – on the indexation mechanism, and the wage/price bargaining mechanism. The impact on the debt-to-GDP ratio is likely to be stronger and more persistent given the adverse implications of the denominator effect.

Apart from boosting debt, lower inflation entails three medium-term effects on fiscal variables (table 1), which do not depend on rigid assumptions: Compared to a baseline with higher inflation, real revenue from personal income taxes would be dampened due to reduced bracket creep. The size of this effect can be inferred from the elasticities of the personal income tax with regard to its base variables (see Prammer and Reiss, 2014). A 1% decrease in inflation feeding through to a 1% drop of average wages (pensions) causes the revenue from personal income tax on wages (pensions) to contract by 1.8% (2.05%) compared to the baseline. The ratio of income taxes to GDP shrinks as a consequence. Lower inflation furthermore reduces the real revenue losses of nominally fixed excise duties (as well as of the motor vehicle tax and property tax). On the expenditure side, lower inflation limits the erosion of nominally fixed (social) transfers such as long-term care and family benefits. The effects on excise duties should more or less offset the effects on transfers.

To sum up, it is difficult to determine the exact impact inflation has on the fiscal deficit and on debt. Nevertheless, there is a clear tendency that lower inflation would adversely affect both the debt ratio and the (structural) budget balance in Austria. Amid low inflation, it would therefore become more challenging to comply with the requirements of the Stability and Growth Pact (SGP), especially with regard to the debt rule. The effects on the budget balance are more limited, however, and, as of end-2014, the SGP requirements for Austria under the preventive arm prescribing an improvement of the structural budget balance tend to be stricter than the debt rule.

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Housing Markets in Austria, Germany and Switzerland

Martin Schneider and Karin Wagner[1]

Running counter to the sharp rise in house prices and housing wealth observed since the mid-1990s in the vast majority of European countries, real house prices in Germany and Austria were going down in this period and did not start to rise until 2010 or 2007, respectively. This reflects national idiosyncracies in housing markets and motivated the discussion of relevant peculiarities in, and similarities among, Austria and Germany as well as Switzerland. Among the most important structural features that ensured housing market stability in these three countries during the last decade are well-developed rental markets, low homeownership ratios and conservative lending standards. While the tax systems of Germany and Austria do not encourage indebtedness, Swiss taxpayers benefit from taking on a lot of leverage. Recent house price increases in all three countries under review here can be attributed to various crisis-related channels (extremely low interest rates, economic uncertainty, safe-haven effect) as well as to demographic developments, including immigration. The Swiss authorities have already implemented a number of macroprudential measures to safeguard the banking sector.

JEL classification: R31, E32, E44
Keywords: house prices, rental markets, housing finance, taxation

As housing assets account for a considerable part of a country's welfare, wealth and GDP, they significantly shape the long-term development of economies. Housing markets and housing finance have undergone remarkable changes over the past decades in Europe as well as in the United States. In the vast majority of European countries, house prices and housing wealth have risen sharply since the mid-1990s. At the same time, household debt has reached record levels in many countries, largely as a result of the decrease in real and nominal interest rates and the introduction of a wide range of financial innovations on mortgage markets (product diversification, housing equity withdrawal and securitization).

National housing markets differ in many ways. Hence, the various aspects of the respective national housing and mortgage markets must be thoroughly analyzed to find out why housing markets in Austria, Germany and Switzerland deviated from European trends. This article aims to compare developments in these countries from various angles with a special focus on financial stability.

1 House Price Developments in Austria, Germany and Switzerland – Some Stylized Facts

While some euro area countries (e.g. Greece, Spain) started to experience a pronounced upswing in house prices in the early 2000s and others (Ireland, the Netherlands, Finland) had done so even earlier, in the second half of the 1990s, Germany, Austria and Switzerland deviate substantially from this pattern.

In *Austria,* house prices remained stagnant until 2005, when a marked upward trend emerged that has since resulted in the sharpest property price increases seen in the euro area in recent years. From the first quarter of 2007

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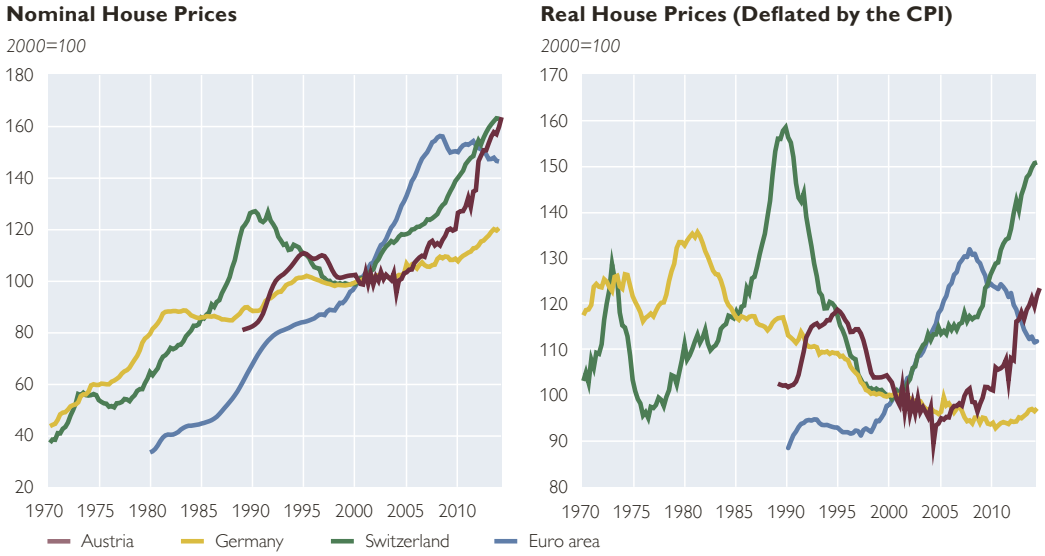
through the third quarter of 2014, nominal prices rose by 44%, against the backdrop of a continued stagnation of house prices in the rest of the euro area.

Germany stands out with a 1.3% annual increase in nominal house prices between 1980 and 2013, which in fact implies a net decline in real house prices. This development can be attributed to a variety of factors which are examined in more detail below. The key drivers are a low homeownership ratio due to well-developed rental markets, an oversupply of housing units due to a policy-induced building boom following German reunification, and conservative lending practices by German banks. The recent upswing of the housing market has been largely driven by sound economic growth and the good performance of the German labor market, which supported household income. The slump in Eastern and Southern EU countries triggered a wave of immigration to Germany in recent years (chart 2, right panel). The financial and economic crisis contributed to price increases due to increased demand for safe assets and extremely low financing costs.

Switzerland experienced a house price bubble in the 1980s that burst in 1990. This bubble was fueled by a substantial increase in the money supply following the launch of the Swiss Interbank Clearing System (Borowiecki, 2009), as more efficient interbank clearing broadened funding opportunities for banks. Mortgage growth was even higher than the growth of real estate prices. Between 1981 and 1992, total mortgages extended by Swiss banks increased by 148%. After the bubble burst, a recession from 1990 to 1993 confronted the Swiss economy with the need for massive restructuring due to increasing globalization. The sharp decline of real estate prices in combination with the macroeconomic slowdown had considerable adverse

Chart 1

Nominal and Real House Prices in the Euro Area versus Austria, Germany[1] and Switzerland

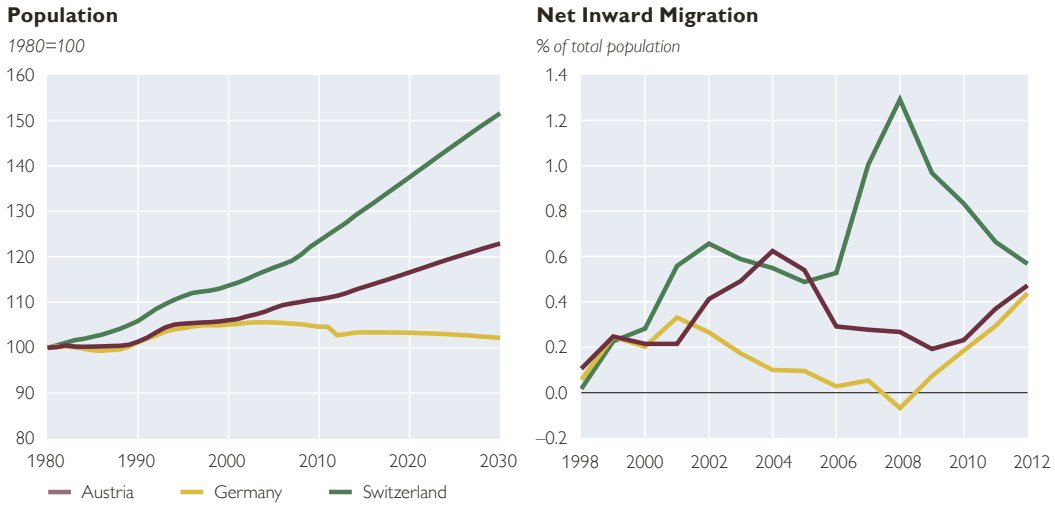


Source: BIS, OeNB, TU-Wien.

[1] *The house price series for Germany is subject to multiple breaks (4 Western German cities before 1975, 50 Western German cities until 1991, 125 cities until 2004, all cities and districts since 2004) and must therefore be interpreted with caution.*

Chart 2

Demographic Changes in Austria, Germany and Switzerland



Source: Eurostat.

effects on Swiss banks. Between 1991 and 1996, they incurred estimated losses of more than 10% of Swiss GDP (BIS, 2004).

The recent upswing in the Austrian and German housing market has also been driven by the global financial situation. Given increased demand for safe assets, the housing market became an investment vehicle of choice for international investors and for domestic households seeking to protect the value of their assets. Furthermore, this tendency has been reinforced by low returns on financial assets. All three countries have benefited from an environment of low interest rates, which moreover reflects their safe-haven status. Interest rates for mortgage loans have, thus, been on the decline since the end of 2008.

Whilst nominal house prices (chart 1, left panel) were rising for most of the time in Austria, Germany and Switzerland, real house prices (chart 1, right panel) in fact diverged between the countries. Given the impact of demographic and economic developments (see chart 2 and table 1) on house prices, the fact that house prices have been rising more strongly in Switzerland than in Austria and Germany may be related to the fact that the population, including net inward migration, and real disposable income grew most strongly in Switzerland, too.

Table 1

Economic Developments in Austria, Germany and Switzerland

		Austria	Germany	Switzerland
		%		
Population growth	1995–2012	5.8	–1.5	13.3
Real per capita growth of disposable income	1995–2012	12.7	10.7	28.1
Real GDP growth	1995–2013	40.5	25.5	35.1
Real interest rate for mortgages	2010–2013	0.2	1.5	1.1

Source: Eurostat, ECB, SNB.

2 The Relationship between House Prices and Fundamentals

Are the house price increases outlined above justified by fundamentals? To assess price developments, the OeNB has developed a Fundamentals Indicator for Residential Property Prices (Schneider, 2013). This indicator is calculated on the basis of seven subindicators that monitor a variety of data related to households, investors and systemic factors. To capture the perspective of households, two subindicators have been included to represent different affordability aspects of homeownership. With a view to including the investor perspective, two indicators have been included to reflect the profitability of real estate investments. Another three subindicators are meant to capture the systemic perspective by mapping the relationship between the residential property market, macroeconomics and financial stability.

This indicator shows that residential property prices in *Austria* were in line with fundamentals in Q3/14, apart from a likely overvaluation of 20% for Vienna. Calculating this indicator with data for *Germany,* we see an undervaluation of 7% in Q3/14. In October 2013, the Deutsche Bundesbank analyzed house price developments based on regional data for residential property prices as well as demographic and macroeconomic factors. The results show that from a macroeconomic perspective, house prices are in line with their fundamental determinants – again with the exception of properties in urban areas, which are likely to be overvalued by between 5% and 10%. In major attractive cities, this overvaluation can amount to up to 20% (Deutsche Bundesbank, 2013).

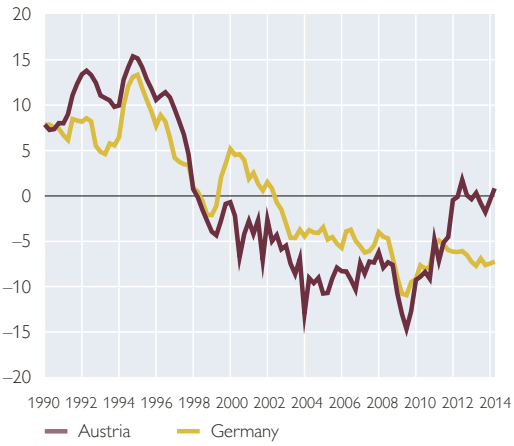
Since we do not have the proper time series to calculate the indicator for *Switzerland,* we looked at the UBS Swiss real Estate Bubble Index (UBS, 2014), whose structure is similar to that of the OeNB's Fundamentals Indicator for Residential Property Prices. The main difference is the presentation of the results. While the OeNB indicator shows the deviation of residential property prices from fundamentally justi-

Chart 3

Residential Property Misalignment Indicators

Residential Property Misalignment Indicators for Austria and Germany

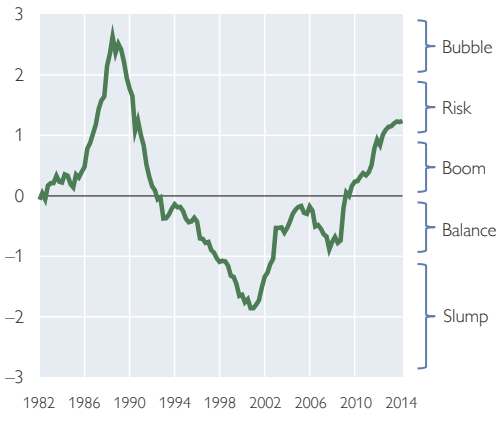
Deviation of residential property prices from fundamentals in %



Source: OeNB calculations.

UBS Swiss Real Estate Bubble Index

Deviation from mean in standard devations



Source: UBS.

fied prices in percent, the UBS indicator presents the deviation in standard deviations. The results show that prices are clearly above their fundamentals, although the increase of the deviation seems to be slowing down.

3 Differences in Housing Market Policies and Structures

Low Homeownership Ratios and Well-Developed Rental Markets Dominate

In an international perspective, all three countries under review here have very low ownership ratios. Within the EU, Austria (58%[2]) and Germany (53%[3]) have the lowest ownership ratios (table 2), far below the EU-28 average of 71% (2012). The low ratios are essentially the consequence of well-developed rental markets,[4] on top of a well-developed social housing sector in *Austria* and *Germany*. Furthermore, subsidies for homeowners are not as high in Austria and Germany as in countries like Spain or the Netherlands. The fact that Germany has a lower ownership ratio than Austria may reflect the higher degree of regional mobility observed in Germany.

In terms of housing policies, the main objective of *Austria* is to provide affordable housing of high quality. Homeownership is not defined as an explicit target. The Austrian housing model rests on five pillars: (1) housing subsidies, (2) the legal framework consisting of private law, building regulations and property development regulations, (3) limited-profit developers of affordable housing ("gemeinnützige Bauvereinigungen"), (4) building and loan associations ("Bausparkassen") and home loan banks ("Wohnbaubanken"), as well as (5) other financial intermediaries, including property investment funds.

Austrian legislation on residential tenancy is characterized by a high degree of complexity: different provisions apply depending on the date when a building was erected or when the lease was signed, or depending on the type of subsidies granted. In general, residential tenancy law provides a fairly high level of protection for tenants. Moreover, the share of social rents is quite high in international comparison, in a market with a high share of rented housing: 20% of tenants live in public housing apartments ("Gemeindewohnung"), 40% in homes erected by limited-profit developers of affordable housing, and just 40% of the tenants rent from private landlords. Under this environment, the expected return of renting is quite low for private investors. Thus, both the high share of social rents and the high share of regulated rents seem to have dampening effects on rental and property prices.

Activity in the *German* housing market was dominated to a larger extent by the construction of social housing than in most other euro area countries after World War II, given the magnitude of the destruction experienced. A well-functioning system of social housing

[2] *The share of owners also includes relatives (on the assumption that they reside in additional homes of the owner). The share of owners without relatives is 51%.*

[3] *The ratio of 53% relates to the share of persons living in owner-occupied homes. Based on the corresponding share of households, this ratio drops to 43%.*

[4] *The size and structure of the rental market has an important impact on the level and volatility of residential property prices. In countries with well-developed rental markets, households can wait and save money for down-payments. In countries without well-developed rental markets like the United Kingdom, households face problems in finding rental homes, so that even young and low-income households apply for mortgages. This may foster the development of subprime markets.*

was built up with both public and private funds. Important pillars of the German housing policy besides social housing are the promotion of homeownership, direct subsidization of lower-income households and market-oriented rents within the freely financed rental housing sector (Cornelius and Rzeznik, 2014). Housing policy has historically been sensitive to the rights of tenants. However, liberalizations of the rent system have led to a more balanced approach.

In *Switzerland,* homeownership is an explicit target of housing policy. Under the Swiss Federal Constitution, housing policy is meant to encourage the ownership of apartments and houses for own use. An important element is the possibility of early withdrawals of pension fund assets of pillar 2 and 3a for homeownership. In practice, the Swiss authorities have maintained a more ambivalent attitude, resulting in a homeownership rate of just 37% in Switzerland. Among other things, this low rate reflects the fact that, on a country-wide basis, housing unit purchases ("Stockwerkeigentum") have been possible only since 1965 (Wehrmüller, 2014). Moreover, the high costs of housing due to the scarcity of land and a large foreign-born (often transient) population add to the huge size of the rental sector. Last but not least, rental housing is eligible for subsidies at the federal and cantonal level.

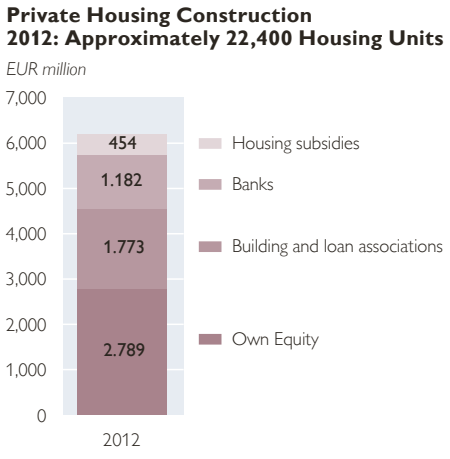
Having examined the determinants of homeownership rates in Europe, especially the role of the state, Springler and Wagner (2009) show that tax incentives have a significant positive impact on homeownership rates. As interest rates have an inverse impact on homeownership rates, they conclude that the liberalization of European mortgage markets and the ongoing innovations in the field of housing finance have a positive impact on homeownership rates.

Housing Subsidization and Rental Market Regulation

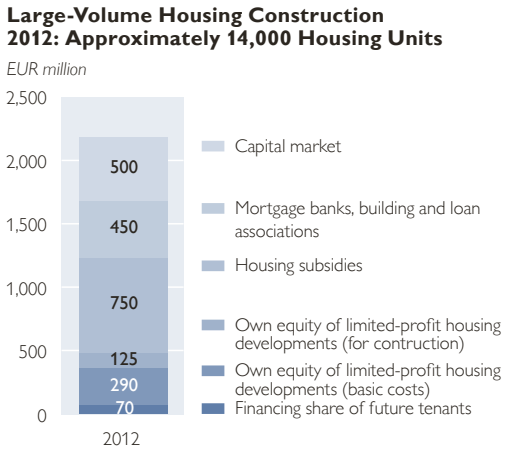
Housing subsidization and rental market regulation are closely interlinked in many countries, with subsidized segments of the rental market being subject to a higher degree of regulation.

Chart 4

The Role of Subsidies in Housing Finance in Austria



Source: Arbeitsforum Bausparkassen.



Source: Arbeitsforum Bausparkassen.

In *Austria,* different types of housing subsidization play a major role in supporting both large-volume construction and the building of private homes. For instance, in 2012, building and loan associations financed almost one-third of the money spent on private housing (approximately EUR 6,200 million). Housing subsidies accounted for EUR 454 million or some 7% thereof. In supporting large-volume housing construction, housing subsidies played an even more significant role, contributing EUR 750 million or 34% of total financing.

The predominant instruments are object-related subsidies; less important instruments include subject-related subsidies, tax incentives and capital market instruments. As outlined above, rental markets are highly regulated, and provisions and the degree of regulation may vary a lot. For instance, rents are quite low for buildings erected before World War II, and the regulation schemes differ depending on whether the rental agreement was concluded before or after 1994. Rental agreements may be of limited or unlimited duration, and they are subject to different rules for termination by the landlord or for rent increases. Landlords wishing to benefit from subsidies are subject to certain restrictions. While freely financed private housing units can be rented out at market prices, the share of freely financed housing in Austria is very small. Regarding the relative size of the sectors, social rental agreements dominate in Austria, whereas the private rental sector dominates in Germany and Switzerland.

In *Germany,* both object-oriented and subject-oriented subsidies play a role. The two main instruments of housing policy are supply-side social housing subsidies and direct housing allowances ("Wohngeld"). Landlords wishing to benefit from social housing subsidies are subject to certain restrictions (rent ceilings and occupancy control agreements). However, these restrictions apply only for a limited period of time. After that, the house becomes part of the privately financed

Table 2

Housing Market Structure

	Austria	Germany	Switzerland
Housing market structure	Low homeownership ratio (58%)[1]	Low homeownership ratio (53%)[2]	Very low homeownership ratio (37%)
Dominant rental market	Social rental market (60%)	Private rental market	Private rental market
Main housing subsidy instruments	Object-oriented subsidies dominate, but subject-oriented subsidies also play some role	Social housing subsidy Direct housing allowance	Object-oriented subsidies dominate, minor role of subject-oriented subsidies
Duration of rental agreements	Limited or unlimited	Usually unlimited	Usually limited (most contracts, though technically of limited duration, roll over automatically. Notice to terminate tenancy requires material cause, but this is interpreted quite generously in Switzerland)
Duration of restrictions/ duties for landlords	Unlimited	Limited	Limited

Source: Authors' compilation.

[1] The share of owners also includes relatives (on the assumption that they reside in additional homes owned by the owner). The share of owners without relatives is 51%.
[2] The ratio of 53% relates to the share of persons living in owner-occupied homes. Based on the corresponding share of households, this ratio drops to 43%.

sector, implying that rents can be raised to normal market levels and the property can be re-rented without further restrictions (Kirchner, 2005). Rental agreements in Germany are usually unlimited in duration, with some exceptions (tenancies can be terminated, subject to adequate proof, for the landlord's own use or in case landlords intend to change or repair the dwelling substantially). Rental regulation regarding the initial rent and future rent increases depends on the type of the rental agreement. A system of rent control applies to public dwellings and for private dwellings that were built using public funds. The rent depends on the age of the dwelling (built before 2001 or thereafter). Currently, no restrictions apply to rents under new agreements concluded in the private rental market. However, increases of rents in existing agreements are subject to a cap. Recently, the government coalition proposed plans to set a limit also for rents under new agreements, except for those applying to newly built dwellings, in areas with especially tight housing markets.

Switzerland's federal structure accounts for a more fragmented housing subsidization system than in other countries, making a direct comparison difficult. Housing subsidies are granted by the federal government as well as various cantons and municipalities. Object-oriented subsidies dominate. If a loan is granted to an investor, rents have to be set at a value below that of market rents for 15 years. Some cantons have well-developed subsidy schemes, where tenants have to satisfy income requirements to occupy a subsidized apartment. Subject-related subsidies (rental aid) are far less developed than in Austria and Germany and are available in a fraction of the cantons only (Bourassa et al., 2010). In Switzerland, an increase in interest rates on mortgage loans can be partially rolled over to tenants, as an average mortgage-rate index based on the costs of all banks' mortgage loans was introduced in September 2008 as the reference rate for rental-payment adjustments. Rental market regulation is high, as is tenant protection. However, rental agreements are usually limited in duration. Initial rents can be agreed freely, but can be adjusted only if operating and maintenance costs or interest rates increase. Tenants have the right to challenge the initial rent or rent increases during the tenancy. They also have the right to request a rent reduction if they have good cause to suppose that the landlord makes excessive profits on the premises because of significant changes to the calculation basis (Wehrmüller, 2014).

4 Differences in Housing Taxation Schemes

The housing tax system has far-reaching implications for real estate markets. The relevant elements are the deductibility of mortgage interest payments and the taxation of imputed rents, real estate ownership, and real estate transactions.

In Austria, the tax base for real estate tax ("Grundsteuer") is the assessed property value ("Einheitswert") as defined on January 1, 1973, and adjusted since (by a total of 35%, with the latest of only three increases made so far dating back to 1983; Reiss and Köhler-Töglhofer, 2011). The assessed property value is thus clearly below market values, leading to low real estate tax expenses for households. Regarding the taxation of capital gains from the sale of real estate, the existing system was amended in April 2012. Previously, real estate capital gains used to be taxed at the average income tax

rate if the sale occurred within a speculation period (10 years, or 15 years for rented buildings with a depreciation tax shield, subject to exemptions for the main residence and owner-constructed buildings). The new system is no longer linked to a speculation period and provides for taxation at a blanket tax rate of 25%. Some transitional rules apply for property bought before April 2002. Purchases of real estate, finally, are subject to a real estate transfer tax ("Grunderwerbsteuer") and to various fees (land registry fee, mortgage registration fee). The real estate transfer tax will change to a staggered system under the newly announced tax reform (to enter into force on January 1, 2016) with a rate of 0.5% for sales prices of up to EUR 250,000; a rate of 2% for amounts ranging from EUR 250,000 to EUR 400,000; and 3.5% (which is currently the default rate) for any higher amounts. At the same time, a new assessment base will be introduced, reflecting the market value rather than the three-fold property value as under current provisions. Moreover, firms will benefit from a tax allowance for real estate transfers of up

Table 3

Tax Treatment of Owner-Occoupied Housing

	Austria	Germany	Switzerland
Tax on imputed rents	No	No	Yes (based on imputed income (on average 70% of market rents) minus mortgage interest and other expenses)
Mortgage interest deductibility	No (under certain circumstances and up to a very low cap of EUR 730 a year, building costs including mortgage interest payments may be deducted)	No	Yes
Net wealth tax	Abolished in 1994	Abolished in 1998	Yes (based on fair market value of residential property minus debt)
Real estate tax	Tax levied at a basic federal rate (usually 0.2%) multiplied by a municipal coefficient ranging up to 500%; cadastral value from 1973 with no automatic update	Real estate tax on fiscal value at a federal rate of 0.26% to 0.35% in former Western Germany and 0.5% to 1% in former Eastern Germany, multiplied by a municipal coefficient of 100% to 900%. Cadastral value from 1964 (former Eastern Germany: 1935)	0.03% to 0.4% of the market value or the taxable value of the real estate (in about half of the cantons) Based on 50% to 80% of the market value
Real estate capital gains tax	Not on main residence and owner-constructed buildings Yes on other real estate: Capital gains are taxed at 25%. Prior to April 2012: Other real estate was taxed only if sold within a speculative period (10 years; 15 years for rented buildings with a depreciation tax shield)	Yes, for sale within the speculative period (10 years)	Special cantonal real estate tax or ordinary corporate income tax (depending on the canton)
Real estate transfer tax and registration fees	3.5% of sales price (2% for relatives) Land registry fee 1.1% to 2.3% Mortgage registration fee 1.2%	3.5% to 5% of sales price, depending on the state Land registry fee 0.15% to 0.2%. Notary fees about 0.3% to 0.8% Mortgage registration fee about 0.3%	1% to 3% of sales prices (proportional) in all but two cantons

Source: European Commission (2012), authors' compilation.

to EUR 900,000 as well as a staggered corporate system: a rate of 0.5% for amounts of up to EUR 1.1 million; a rate 2% for amounts of up to EUR 1.3 million; and a rate of 3.5% for higher amounts. Farmers will be exempt from real estate transfer tax under the new regulation.[5]

The structure of real estate taxation in *Germany* is similar to that of Austria. The assessed property values are even older than in Austria (1973 for former Western Germany and 1935 for former Eastern Germany). The German tax system favors long-term investment in real estate, since gains realized from property resale within 10 years are subject to income tax. Moreover, speculation is dampened by high transaction costs (real estate transfer tax and high fees to register the transfer of ownership and for the required notary services). Between 1991 and 1998, investors were given a tax break to stimulate residential construction in former Eastern Germany.

Swiss homeowners have to pay income tax on imputed rental income (net of interest payments, maintenance, insurance premiums, administrative costs for third parties, repair costs, etc.) for own-use homes.[6] The tax authorities estimate the imputed rent, which on average amounts to 70% of the potential market rent. Tax rates differ among cantons. In most cantons, homeowners can choose between the deduction of the actual costs and a lump sum deduction, which typically ranges from 10% to 30% of imputed rent. The deductibility of mortgage interest payments explains the predominance of interest-only mortgages in Switzerland.

For wealth tax (which has been abolished in Austria and Germany), the tax base is net wealth, i.e. fair market value minus documented debt. Real estate is on average taxed at 70% of the fair market value of the property. This tax value of the property is assessed by the tax authorities. In addition, some cantons levy a real estate tax. The tax is assessed on the basis of the market value of the property, without allowing for the deduction of debts. Capital gains from selling real estate are subject to a real estate capital gains tax ("Grundstücksgewinnsteuer"), which is levied at the cantonal level. The tax rate depends on the holding period and the amount of profit. To prevent speculation, the tax rate is prohibitively high for short holding periods. However, this tax is waived if the profit is used to buy another property for the same or a higher amount within two years. In most cantons, the purchase of real estate is also subject to a real estate transfer tax ranging from 1% to 3% of purchase price or the taxable value of the real estate. In general, the decentralized tax system in Switzerland contributes to huge disparities of residential property prices.

Implications of the Tax Systems

The effects of mortgage deductibility can be seen in *Switzerland,* where mortgage payments can be deducted when calculating imputed rent. The volume of outstanding mortgage loans is three times as high in Switzerland as in Austria and Germany (relative to GDP). Revenues from recurrent real estate taxes are extremely low in Austria (0.6% of GDP in 2012) and

[5] *As announced in March 2015.*

[6] *In the European Union, only Luxembourg and Netherlands tax imputed rents on the main dwelling (European Commission, 2012).*

Germany (0.9%). In Switzerland, they amount to 2% (OECD Revenue Statistics). High transaction costs stabilize the market in Austria and Germany by fostering long-term investment in real estate and by preventing speculation.

5 Differences in Housing Finance Schemes

National structures of housing finance have important implications for possible risks arising from mortgage debt.

Characteristics of Housing Loans

Several dimensions of housing loans are highly relevant for financial stability. The duration of the interest rate fixation (fixed versus variable rate loans) is important, since variable rate loans entail higher risks if interest rates increase. Foreign currency loans pose multiple risks (currency risk, interest rate risk, the risk that the saving account does not perform). In countries with financial systems that allow equity extraction, rising house prices can be used to extract additional loans for consumption purposes from the wealth of the house. Some countries have mortgage securitization instruments. In general, there has been a trend toward longer maturities, driven by rising life expectancy and related increases in retirement ages (ECB, 2009). In many countries, maturity lengthening was used to improve affordability as prices went up. The lending practices of banks differ from country to country.

Table 4

Characteristics of Housing Finance

	Austria	Germany	Switzerland
Summary			
Overall financing risk	Low to medium, resulting mainly from interest rate risk and foreign currency loans	Low to medium due to moderate indebtedness and a low share of variable rate loans, but lending standards need to be researched more closely	High due to high indebtedness
Role of foreign currency loans	Very high, but decreasing (from 39% in Q2/07 to 22% in Q4/14)	Low	Almost negligible (< 1%)
Interest-only loans	Yes, for foreign currency loans	No	Yes
Prevailing type of interest rate	Very high share of variable rate loans (87%)[1]	Very low share of variable rate loans (15%)	Medium term fixation
Interest rate for adjusting variable interest rate loans	3-month EURIBOR (LIBOR, swap rate)	EURIBOR or other	CHF-LIBOR
Lending practice of banks	Conservative; was more aggressive in the past	Relatively conservative, but more research is needed	Conservative
Loan-to-value limit	Three-fifths (=60%) of value (for mortgage banks' refinancing) §11 of Mortgage Bank Act	No general loan-to-value limit (60% of mortgage lending value for Pfandbrief refinancing)	Usually up to 80% (65% for interest-only loans)
Equity extraction possible/ mortgage equity withdrawal	No evidence that it plays a role	No evidence that it plays a role	No evidence that it plays a role
Mortgage securitization (mortgage-backed securities/ covered bonds)	Yes	Yes	Yes
Typical maturity of loans for home purchase	25 to 30 years	10 to 15 years	Typically 2 to 10 years with the option to roll over
Household indebtedness	Moderate (55% of GDP)	Moderate (59%)	Very high (124%)

Source: Authors' compilation, ECB (2009).

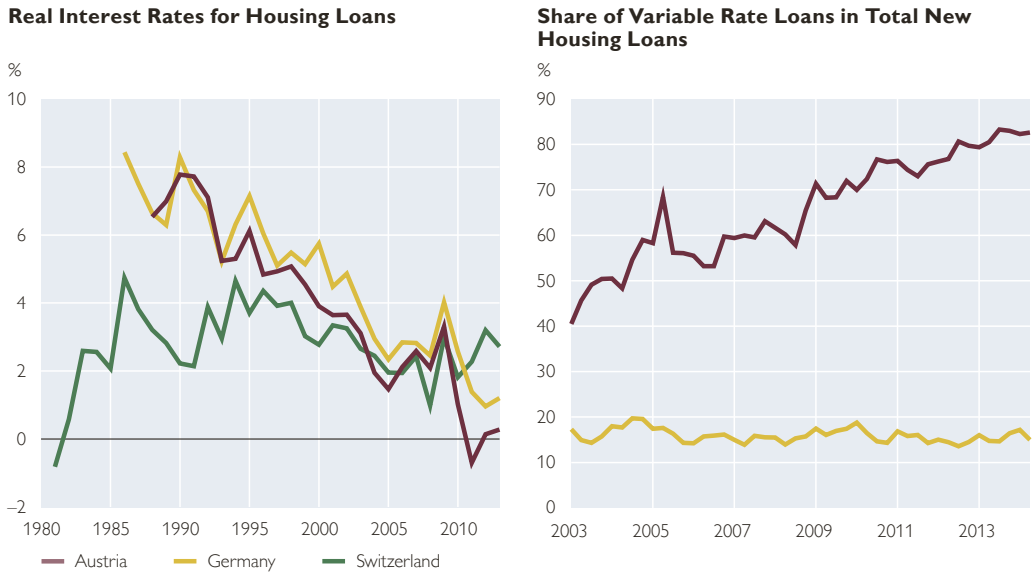
[1] *This is the share of newly issued loans with an initial period of fixation up to 1 year to all newly issued loans.*

One distinct feature of housing loans in *Austria* used to be the high popularity of foreign currency loans. Foreign currency loans started to become popular in the second half the 1990s, probably mostly due to exchange rate effects. Their share in the total volume of outstanding loans peaked at 39% in the first quarter of 2007. Since then, the foreign currency loan share has fallen continuously to 22.3% (Q4/14). Furthermore, housing loans tend to be variable-rate loans, whose share has steadily increased from 40% in early 2003 to 86.7% in Q4/14 (see chart 4). For more information on foreign currency loans and their distribution among households, see Albacete and Lindner (2015). In Germany, mortgage lending is conservative with long maturities and a high share of fixed-rate loans. Over 70% of newly issued mortgage loans have a fixed rate of more than five years. Currently, there is no sign that lending standards are becoming more relaxed.

In *Switzerland,* mortgage loans are offered by banks, insurance companies and pension funds. The overwhelming majority of mortgages are provided by banks. Swiss mortgage indebtedness is very high by international standards, but so is net wealth. One distinct feature of Swiss mortgages is that prior to 2012, interest-only loans dominated. Self-regulation measures of the Swiss Bankers Association implemented in 2012 and 2014 define compulsory amortization (see next section). Mortgages in Switzerland typically have a maturity of between 2 and 10 years with the option to be rolled over. At the current low level of interest rates, longer maturities are becoming increasingly popular. Interest rates can be either variable or fixed. When a mortgage is rolled over, the interest rate of the new loan can increase substantially. The typical duration until full amortization is about 20 to 30 years. The required downpayment currently amounts to 10% of the property's

Chart 5

Interest Rates and the Share of Variable Rate Loans



Source: ECB, Thomson Financial, IMF.

value. Pension fund assets were allowed for the downpayment until 2012. An important element of housing finance in Switzerland is the possibility of early withdrawal of funds accrued under the occupational pension scheme (second pillar) and the private pension scheme (third pillar) for the purchase or construction of owner-occupied residential property (Wehrmüller, 2014).

Mortgage Debt and Household Net Wealth

In terms of households' total assets and liabilities, there is a striking difference between Austria and Germany on the one hand, where the volume and structure of assets and liabilities is very similar, and Switzerland on the other (table 5). In Austria and Germany, real estate assets amount to more than 50% of total assets, whereas in Switzerland, financial assets are more important than real estate assets. Even so, Swiss households (279%) clearly outperform Austrian (213%) and German (209%) households when we compare the relative magnitude of households' real estate assets (expressed as percentages of GDP). The volume of outstanding mortgage loans is low in Austria measured in terms of GDP (36.5%) as well as in percent of the value of real estate assets (17%). Switzerland has a very high volume of mortgage loans (116% of GDP). Measured in terms of the value of real estate assets, mortgage loans amount to 42%. Household net wealth is very similar in Austria and Germany (slightly above three times GDP or above EUR 100,000 per capita at purchasing power parity). In Switzerland, household net wealth amounts to five times GDP or EUR 204,000 per capita at purchasing power parity. This difference stems mainly from financial assets.

Sources of Housing Loans and Funding

In most European countries, banks are the key sources of mortgage loans, followed by insurance companies and pension funds. In Austria and Germany, saving banks and cooperatives play an important role. In Austria, (subsidized) housing loans are also provided by the provinces.

Table 5

Household Assets and Liabilities (2012)

	Austria	Germany	Switzerland	Austria	Germany	Switzerland
	% of GDP			*EUR per capita at 2012 purchasing power parity*		
Total assets	385.2	394.6	632.0	127,952	124,325	253,762
Financial assets	172.5	185.2	352.7	57,297	58,350	141,628
Real estate[1]	212.7	209.4	279.3	70,655	65,975	112,135
Total liabilities	54.9	58.7	124.3	18,235	18,494	49,925
Loans	54.5	58.2	124.1	18,102	18,337	49,824
Mortgage loans[2]	36.5	41.3	116.4	12,124	13,006	46,733
Consumer loans	7.2	6.7	2.6	2,384	2,126	1,061
Other loans	10.8	10.2	5.0	3,590	3,205	2,010
Other liabilities	0.4	0.5	0.3	133	158	100
Net wealth	330.3	335.9	507.7	109,716	105,830	203,838

Source: Eurostat, ECB, SNB, HFCS 2010, authors' calculations.

[1] *Real estate wealth for Austria and Germany (for 2010) is taken from the Household and Consumption Survey (HFCS) 2010 and extrapolated using house price growth.*

[2] *Loans from banks and from other lenders (states or provinces) for Austria and Germany.*

Savings plans with building and loan associations are still very popular in Austria, given attractive base interest rates and the government bonus for such saving plans, which serve as an incentive. Furthermore, loans linked to such savings plans are subject to comparably low interest rates apply at the beginning of the maturity period and capped with a rate of 6% interest. In December 2014, the volume of outstanding loans granted by building and loan associations came to EUR 19 billion. The number of savings plans with building and loan associations in Austria totaled 5,288,827 in December 2014 (which is approximately one-eighth of all loans granted by Austrian financial institutions and a share of 62% when measured against the Austrian population).

Refinancing by Banks

Banks in Europe mostly rely on their general funding sources (especially deposits) for housing loans. According to the financial accounts, just EUR 15 billion of the total volume of housing loans of EUR 113 billion in 2013 were government-financed in *Austria*.

However, there are some exceptions. In *Germany,* banks issue long-term covered bonds ("Pfandbriefe") in line with households' preferences for a long interest rate fixation. Yet only a small portion of mortgages are used for Pfandbrief coverage. In Switzerland, covered bonds doubled from 2004 to 2013, to EUR 72.9 billion. In Austria, housing bonds play also a minor role (EUR 11.4 billion in 2012).

6 Macroprudential Framework and Policy Measures

National macroprudential supervision in EU countries is embedded in a complex institutional framework at the EU level. In this context, *Austria* established the Financial Market Stability Board (FMSB) in 2014, which integrates all relevant national financial stability stakeholders: the Federal Ministry of Finance, the Austrian Fiscal Advisory Council, the Austrian Financial Market Authority (FMA) and the Oesterreichische Nationalbank (OeNB). The FMSB may issue recommendations to the FMA as the competent authority, release warnings on questions of systemic risk and publish its decisions and warnings (Eidenberger et al., 2014).

Before the establishment of the FMSB, the Financial Market Authority had deployed a set of measures to address risks arising from foreign currency loans and loans with repayment vehicles. In October 2003, the FMA published its minimum standards for granting and managing foreign currency loans and loans with repayment vehicles. In October 2008, the FMA enhanced those measures by issuing a recommendation to the banking industry to stop extending foreign currency loans. Subsequently, it further refined this recommendation with a supplement issued in 2010. Finally, new minimum standards for the risk management and granting of foreign currency loans and loans with repayment vehicles entered into force in January 2013. These minimum standards do not constitute a regulation in the legal sense and do not prevent credit institutions from setting higher internal standards.

The *German* equivalent to the Austrian Financial Market Stability Board and hence the lead macroprudential financial supervisor is the Financial Stability Commission (FSC), which was founded in 2013. It consists of representatives of the Federal Ministry of Finance, the Deutsche Bundesbank, the Federal Financial Supervisory Authority and, as a nonvoting member, the Federal Agency for Financial Mar-

Table 6

Institutional Macroprudential Framework and Policy Measures

	Austria	Germany	Switzerland
Institutional macroprudential framework	Financial Market Stability Board (FMSB, established in 2014) Federal Ministry of Finance Fiscal Advisory Council Financial Market Authority (FMA) Oesterreichische Nationalbank (OeNB)	Financial Stability Commission (FSC, established in 2013) Federal Ministry of Finance Deutsche Bundesbank Federal Financial Supervisory Authority (BaFin) Federal Agency for Financial Market Stabilisation (FMSA)	Informal arrangement based on Memorandums of Understanding Self-regulation regime implemented by the Swiss Bankers Association (SBA) Swiss National Bank (SNB) Swiss Financial Market Supervisory Authority (FINMA) Federal Department of Finance (FDF)
Policy action taken	FMA measures addressing foreign currency loans and loans with repayment vehicles taken in 2003, 2010 and 2013 (recommendations and minimum standards)	Warnings issued by the Deutsche Bundesbank First FSC report published in 2014 No macroprudential measures have been implemented	SBA self-regulation implemented in mid-2012 Countercyclical capital buffer (+1 pp from September 2013; +2 pp from June 2014)

Source: Authors' compilation.

ket Stabilisation. The FSC presented its first annual report in June 2014. Developments in the residential property market are monitored on an ongoing basis.

In October 2013, the Bundesbank published an analysis of house price developments based on regional data for residential property prices and demographic and macroeconomic factors. The results show that from a macroeconomic perspective, house prices are in line with their fundamental determinants. Properties in urban areas, however, are likely to be overvalued by between 5% and 10%. In major attractive cities, this overvaluation can amount to up to 20% (Deutsche Bundesbank, 2013). No official policy measures have been introduced in Germany yet.

In *Switzerland,* no single authority has an explicit macroprudential mandate. Instead, the responsibilities are shared between three institutions. The Swiss National Bank (SNB) and the Financial Market Supervisory Authority (FINMA) are responsible for financial stability. The SNB analyzes risks to the banking sector, including the monitoring of real estate and mortgage markets. The focus of FINMA's analysis is mostly on individual institutions. In addition, the Federal Department of Finance has significant power in implementing financial regulations. The Swiss arrangement is fairly informal, since it is based on Memorandums of Understanding between the participants rather than being stipulated by law (IMF, 2014).

An important element of the Swiss macroprudential framework is the self-regulation regime implemented by the Swiss Bankers Association (SBA). It entered into force in July 2012 and includes minimum requirements for downpayments by borrowers as well as a definition of compulsory amortization. Borrowers are required to supply at least 10% of the lending value of the property from their own funds, excluding pension fund assets. Mortgages must be paid down to two-thirds of the lending value within a maximum of 20 years. In June 2014, the SBA adjusted its self-regulation regime, shortening the amortization period from 20 to 15 years, and tightening rules for risk weighing mortgages.

Acting on an official SNB proposal, the Swiss Federal Council introduced a countercyclical capital buffer (CCB) framework in July 2012. Accordingly, banks can be required to hold additional capital of up to 2.5% of their total risk-weighted assets in Switzerland. The CCB was activated in two steps: In February 2013, the Federal Council decided to set the CCB at a level 1% of from September 2013; in January 2014, the CCB was increased from 1% to 2%, to take effect from June 2014.

7 Summary

Comparing housing markets in Austria, Germany and Switzerland along various dimensions, we found house prices in these three countries to have developed quite differently compared with many European countries that experienced a pronounced cycle. In recent years, price increases accelerated, mainly driven by various crisis-related channels (extremely low interest rates, flight into real assets, safe-haven effect) and increasing immigration. Despite the recent price increases, house prices are in line with fundamentals in Austria and slightly undervalued in Germany. In Switzerland, prices seem to be overvalued.

This study has identified important key elements that contribute to stable housing and mortgage markets. A well-developed and regulated rental sector is an important factor that helps keep house prices stable. The taxation system can have an important impact on house prices and household indebtedness. Especially the tax deductibility of mortgage interest expenses can create incentives for high household debt.

While all three countries have established macroprudential frameworks, Switzerland has already implemented macroprudential policy measures to combat credit expansion.

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