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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 post-doc) who work in the fields of macroeconomics, international economics or financial economics and/or with a regional focus on Central, Eastern and Southeastern Europe.

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

Applications (in English) should include

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

Applications for 2014/15 should be e-mailed to
eva.gehringer-wasserbauer@oenb.at
by May 1, 2014.

Applicants will be notified of the jury's decision by mid-June 2014. The following round of applications will close on November 1, 2014.

Analyses

Austrian Economy to Grow by 0.5% in 2013

Gerhard Fenz[1]

No Economic Momentum in the First Half of 2013

The Austrian economy continued in the doldrums in the first half of 2013, which means that it has been stagnating for more than a year now. In the second quarter of 2013, economic output grew by 0.1% according to the first release of national accounts data (in real terms, seasonally and working day-adjusted, on a quarterly basis), thus remaining at first-quarter levels.

Austria's sluggish GDP growth performance reflects above all the difficult and mixed external economic conditions. Whereas both the U.S. and Japanese economies picked up steam and the Chinese economy grew fairly vigorously, despite financial market difficulties, European GDP growth was and remains very muted. Key sales markets such as Italy, Hungary, the Czech Republic and Slovenia are mired in recession. As a result, Austrian goods exports in the first half of 2013 rose by a mere 1.1% in nominal terms. The results of the OeNB export indicator imply that this trend continued into the third quarter of 2013 (see chart 1).

Net exports were, nonetheless, the sole driver of GDP growth on the demand side in the previous quarters. While export growth was weak, imports declined. Slowing import growth is the result of very sluggish domestic demand. In view of high uncertainty and poor sales opportunities, many companies have curtailed or postponed planned investment, whereas slack real income growth and decelerating employment momentum have constrained personal consumption. Government consumption growth did not suffice to offset the modest decline in personal consumption and the sharp fall in gross fixed capital formation.

Table 1

Results of the National Accounts

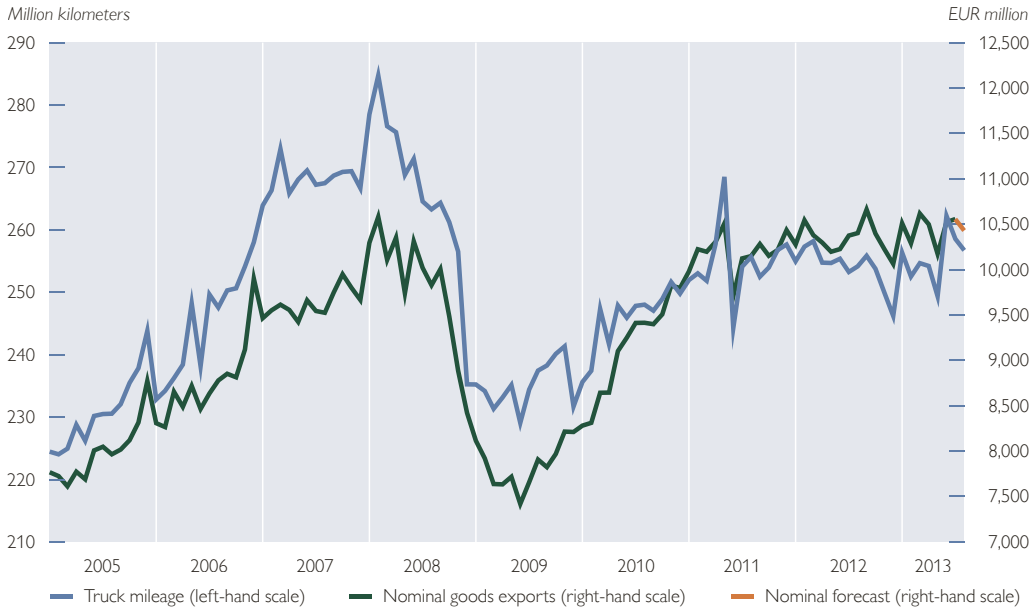
	GDP	Private consumption	Government consumption	Gross fixed capital formation	Exports	Imports	Domestic demand (excluding inventories)	Net exports	Changes in inventories	Statistical differences
	Annual and / or quarterly changes						*Contribution to GDP growth in percentage points*			
Q1 12	+0.4	+0.1	–0.1	+0.3	–0.1	–0.3	0.1	0.1	–0.1	0.3
Q2 12	+0.2	–0.0	–0.1	–0.0	+0.7	–0.2	–0.0	0.5	–0.1	–0.2
Q3 12	+0.1	–0.1	–0.0	–0.4	+0.7	–0.2	–0.2	0.5	–0.0	–0.2
Q4 12	–0.1	–0.1	+0.2	–0.9	+0.1	–0.3	–0.2	0.2	–0.0	–0.0
Q1 13	+0.1	–0.1	+0.4	–1.2	+0.3	–0.4	–0.2	0.4	–0.0	–0.1
Q2 13	+0.1	–0.0	+0.3	–0.9	+0.3	–0.1	–0.1	0.2	0.0	0.0
2009	–3.5	+1.3	+1.2	–6.9	–14.0	–12.2	–0.6	–1.9	0.0	–1.0
2010	+1.9	+1.5	+0.1	–0.8	+8.4	+8.4	0.7	0.5	0.8	–0.0
2011	+2.9	+1.1	+0.5	+7.4	+6.8	+7.5	2.1	0.1	–0.4	1.1
2012	+0.6	+0.3	+0.0	+1.7	+1.7	–0.0	0.5	1.0	–0.6	–0.2

Source: Austrian Institute of Economic Research (WIFO).

[1] *Oesterreichische Nationalbank, Economic Analysis Division, gerhard.fenz@oenb.at. With the collaboration of Friedrich Fritzer, Fabio Rumler and Martin Schneider.*

Chart 1

OeNB Export Indicator of September 2013 (seasonally and working-day adjusted)



Source: Highway authority ASFINAG, OeNB.

Austrian Economy to Grow by 0.5% in 2013 Fueled by Second-Half Recovery

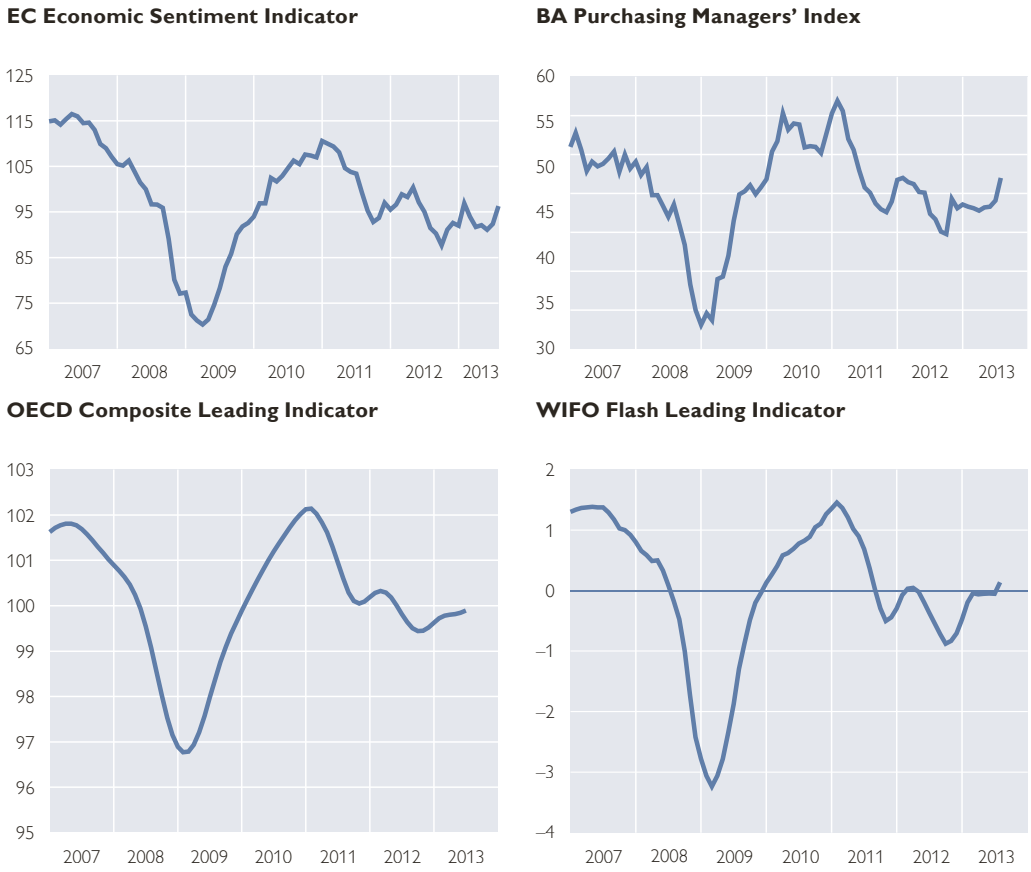
Since mid-2013, numerous leading indicators have been signaling renewed growth momentum. After having bottomed out at end-2012, most national and international leading indicators moved sideways in the first half of 2013. Since mid-2013, some of the indicators have been trending up significantly, though. For instance, the Bank Austria Purchasing Managers' Index soared above the growth threshold of 50 points to stand at 52.0 points in August 2013, thereby impressively confirming its recovery, which was already evident in July 2013. This gain was evident in every subindex, with both the order intake and production subcomponents increasing particularly sharply.

The European Commission's current confidence indicators for Austria have also improved recently. Whereas the all-items index at 96.3 points still remained below its historical average of 100 in August 2013, the subindices for the construction and retail sector registered above-average figures. In addition, the OECD Composite Leading Indicator and WIFO's leading indicator – two monthly composite indicators that condense the data of many leading indicators – currently show an uptrend.

This improved sentiment has, so far, not passed through to the indicators of real activity. For instance, industrial production (industrial production excluding steam and air conditioning supply, which is not sensitive to the economic cycle: NACE B–D excluding D353) grew by just 0.4% in 2012 and even stagnated in the first half of 2013. Yet real activity measures are only available with a lag of several months (currently up to and including July 2013). By contrast, growing foreign order intake and greater corporate confidence worldwide indicate accelerating export momentum for the rest of

Chart 2

Improved Sentiment Indicates Economic Upturn

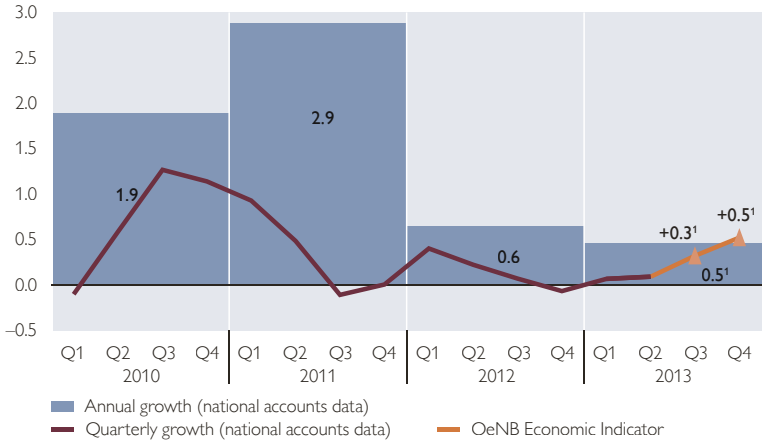


Source: European Commission, Bank Austria, OECD, Austrian Institute of Economic Research (WIFO).

Chart 3

Short-Term Outlook for Austria's Real GDP in the Third and Fourth Quarter of 2013 (seasonally and working-day adjusted)

Change on previous period in %



Source: OeNB Economic Indicator of September 2013, Eurostat.

[1] As forecast.

2013. Growing export demand will in turn reboost the propensity of companies to invest and industrial activity. Furthermore, falling inflation and rising real wages will offer Austrian households scope for additional consumer spending. Overall, domestic demand will become more important as a driver of economic growth in the next few months.

The economic upturn will, however, prove subdued because external economic conditions are set to remain mixed. The results of the OeNB Economic Indicator of September 2013 suggest that Austrian GDP will grow by 0.3% on a quarterly basis in the third quarter of 2013. The fourth quarter of 2013 will see growth inch up to 0.5% quarter on quarter. Although this

level corresponds to historically average Austrian GDP growth, it is still fairly modest for an economic upturn. Owing to the economy recovering in the second half of 2013, Austrian GDP growth for 2013 as a whole will be 0.5% year on year.

The risks to the forecast remain mostly tilted to the downside. While domestic risks are considered to be largely balanced, the risk that the European debt crisis may reintensify has not been averted.

Growing Unemployment despite Record Employment

Despite the sluggish economic momentum, the Austrian labor market registered a rise in employment in recent months. So far this year, employment has risen by 17,000 persons (+0.5%) on an annual basis up to and including August 2013. The same month saw 3.54 million persons registered as dependently employed. The jobless numbers have continued to rise as well, though. In August 2013, 263,100 persons were registered as unemployed, which is an increase of 13.1% on August 2012. While the rise in unemployment numbers has driven up the national unemployment rate slightly, no such rise is currently evident from the Eurostat unemployment rate, which stood at 4.8% in July 2013 following several revisions. Compared with other EU countries, labor market conditions are still excellent in Austria. Austria continues to boast the lowest unemployment rate in the EU, except for youth unemployment, where Germany leads the ranking (9.2% in Austria). The number of layoffs preannounced to the AMS (Public Employment Service Austria) surged in the period from May to July 2013, but this figure is distorted to the upside by the bankruptcies of the construction group Alpine GmbH and the drugstore chain Dayli.

Employment growth is dominated by the continued strong inflow of foreign labor from the eight countries that

Table 2

Key Indicators for the Austrian Labor Market

	Payroll employment		Unemployed persons		Unemployment rate in %		Registered job vacancies		Preannounced layoffs (AMS early warning system)	
	Thousands	Annual change in %	Thousands	Annual change in %	AMS definition (seasonally adjusted)	EU definition (seasonally adjusted)	Thousands	Annual change in %	Thousands	Annual change in %
2010	3,360	+0.6	250.8	–3.7	6.9	4.4	31.009	+14.1	132,956	–16.2
2011	3,422	+1.8	246.7	–1.6	6.7	4.2	32.310	+4.2	119,000	–10.5
2012	3,465	+1.3	260.6	+5.7	7.0	4.4	29.422	–8.9	129,407	+8.7
Q3 12	3,537	+1.2	229.9	+6.5	7.0	4.5	31.689	–5.5	21,279	+18.8
Q4 12	3,460	+0.9	281.1	+6.3	7.2	4.5	26.195	–7.2	75,468	+321.4
Q1 13	3,423	+0.6	318.3	+7.1	7.3	4.9	24.679	–10.5	22,161	+19.9
Q2 13	3,482	+0.6	255.8	+9.1	7.5	4.7	28.137	–12.7	29,377	+107.3
Mar. 13	3,449	+0.4	290.0	+10.0	7.4	4.8	26.520	–11.9	5,623	+10.6
Apr. 13	3,452	+0.6	273.1	+8.5	7.5	4.8	28.111	–12.2	5,877	+25.5
May 13	3,486	+0.6	251.9	+9.0	7.5	4.6	28.465	–11.9	11,750	+149.4
June 13	3,509	+0.6	242.2	+10.1	7.6	4.7	27.835	–13.9	11,750	+145.9
July 13	3,583	+0.6	256.5	+12.6	7.7	4.8	28.192	–11.8	7,081	+75.8
Aug. 13	3,542	+0.0	263.1	+13.1	7.8	×	27.808	–11.7	8,714	+40.5

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

joined the EU in 2004 (EU-8) and whose citizens finally gained unlimited access to the Austrian labor market in May 2011. From April 2011 to April 2013, employment in Austria rose by 73,000 persons. During this period, an additional 74,000 nonresidents (70% of whom are from EU-8 countries) were hired, whereas the employment figures of Austrian nationals dropped by 1,000.

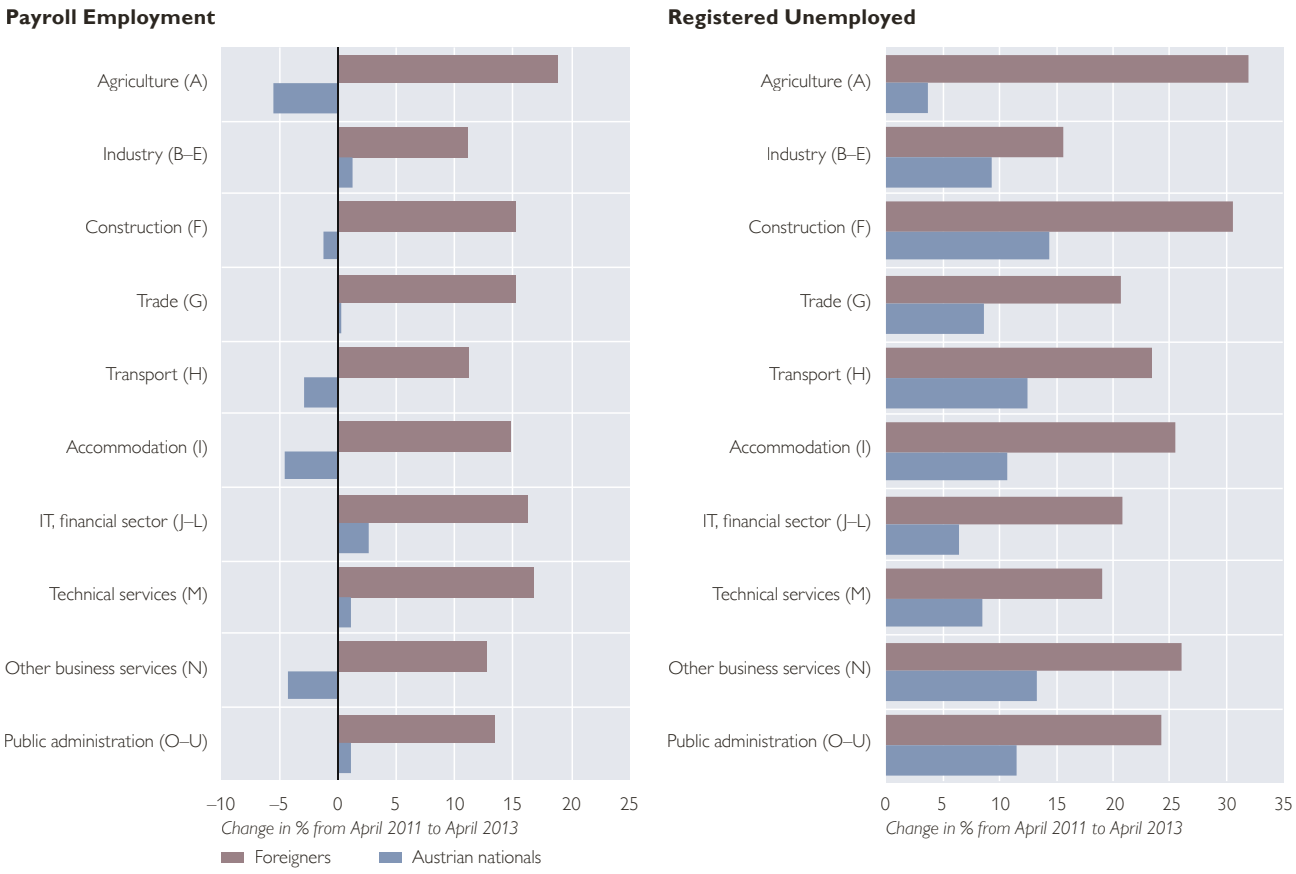
A disaggregated analysis by sector shows that the employment of foreigners expanded in every sector while the decline in employment of Austrian nationals was limited to agriculture, construction, transport, accommodation and other business services.

However, the data currently available do not clearly point to perceptible "crowding-out" effects resulting from the liberalization of the labor market, as the number of registered unemployed rose in every sector for both Austrian nationals and foreigners. If the influx of additional foreign labor has indeed given rise to "crowding-out" effects, domestic and foreign employees have been affected in equal terms.

As in the past, the economic recovery will not be felt in the labor market immediately but with a time lag. For the remainder of 2013, leading indicators such as the falling number of job vacancies anticipate a further increase in unemployment initially. Labor market developments are unlikely to reverse before 2014.

Chart 4

Labor Market Development by Sector from April 2011 to April 2013



Source: Austrian Association of Social Insurance Providers, OeNB.

Inflation will Ease to 1.6% in 2014

In August 2013, Austrian HICP inflation stood at 2.0%, with core inflation (excluding energy and unprocessed food) marginally higher at 2.3%. Inflation measured on the basis of the national CPI was 1.8%.

The downtrend in HICP inflation evident since early 2013 therefore also continued in August 2013. The OeNB inflation outlook of September 2013 projects inflation to drop further until year-end and increase but slightly thereafter. The OeNB therefore anticipates HICP inflation to average 2.1% in 2013 and to drop to 1.6% in 2014. Although core inflation will also ease in the forecast period, it will exceed headline inflation. Average annual core inflation will be 2.2% in 2013 and fall to 2.0% in 2014.

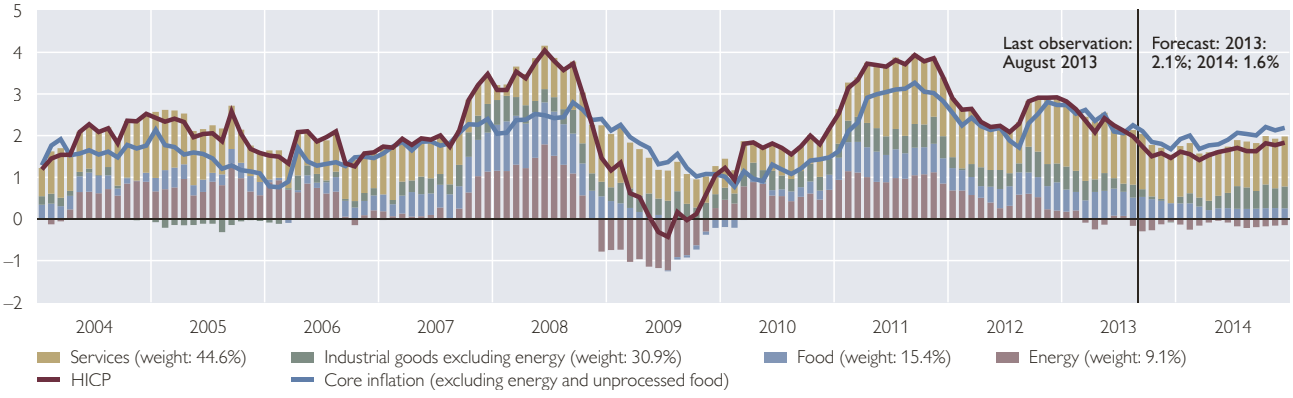
The decline in HICP inflation reflects, above all, steadily falling crude oil prices and sharply slowing wage cost growth until mid-2014. Inflation in the services sector – which led the uptrend in headline inflation in the second half of 2012 – will ease again significantly in the forecast period, driven by decelerating wage cost growth and tumbling crude oil prices, which affect transportation services in particular.

For food (both unprocessed and processed), the OeNB expects inflation to trend down until mid-2014. Although inflation is forecast to rise for certain food items such as milk products, this increase should be compensated by an offsetting decline in wheat, bread and cereals as well as in unprocessed food. In addition, food inflation will be reduced by more moderate wage cost growth. For industrial goods excluding energy, no significant inflationary pressure is foreseeable until end-2013. The producer prices of consumer durables exhibited sharply slowing growth while the annual inflation for consumer perishables remained largely constant at some 1½% in recent months. For the industrial goods sector (excluding energy), the OeNB projects average inflation of 0.9% in 2013. Currently slack demand for vehicles and furniture is expected to pick up in 2014, which means that the modest uptick in inflation in the industrial goods sector should continue.

Chart 5

HICP Inflation and Contributions of Subcomponents

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



Source: OeNB (September 2013), Statistics Austria.

The Distribution of Inflation among Austrian Households

Pirmin Fessler,
Friedrich Fritzer[1]

We estimate the distribution of household-level inflation and show a strong and stable negative relationship between income and inflation that reflects the differences in consumption bundles along the income distribution (2010–2012). Inflation decreases as education levels increase. It is especially high for blue-collar worker households and extraordinarily low for farmer households and shows a u-shaped relationship with age. Our findings question the exclusive focus of economic policymakers on the consumer price index based on a mean consumption bundle in times of diverging price developments. We advocate monitoring inflation of a broader range of real household level consumption bundles, such as inflation across the entire range of household incomes. We use the Austrian consumer survey (2009/10) as well as disaggregated price data to calculate inflation for given consumption bundles at the household level.

JEL classification: E31, C43, C81
Keywords: Inflation, household specific inflation, microdata, distribution

"Any attempt to strike an average for the amount by which purchasing power has changed for a community as a whole necessarily involves equating the purchasing power of money for one class to its purchasing power for a different class, which cannot be done except by an arbitrary assumption. [...] I see no meaning in an assumption to the effect that the purchasing power of money is equal for different classes of the community."

John Maynard Keynes, A Treatise on Money

1 Introduction

In economic theory, inflation is defined as a general increase in the price level of goods and services in an economy over a certain period of time. A higher general price level implies a loss in the real value of money. Relative price changes between goods or services, or price changes resulting from changes in quality or performance, are not part of inflation.

In practice, it is not feasible to measure inflation as it is defined theoretically. Relative price changes between goods cannot be clearly distinguished from price changes resulting from a loss of the value of the medium of exchange, nor can corrections be made for price changes resulting from quality and performance changes. Goods and services change continuously. New goods and services emerge and others disappear. Prices can be observed only if transactions occur. Observing all real transaction prices, or a representative sample of prices, is very difficult for many goods, e.g. housing. When we use the term "inflation" in this article, we refer to its more practical expression, such as a consumer price index, which is a subset of price movements that at the same time considers the full price changes of the goods and services as inflation.

The consumer price index (CPI) commonly computed by statistical agencies can be interpreted as a weighted average of price indices for individual households. Consequently, as long as households consume different bundles of goods and services, the CPI cannot be a perfect indicator of inflation at the individual household level. Consumption patterns among households differ, and if in addition relative prices move, differences between inflation rates among

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We thank Nikolas Albacete, Ernest Gnan, Markus Knell, Rena Mühldorf, Martin Schürz and Beat Weber as well as seminar participants for valuable comments.

households arise. The reliability of inflation measures, i.e. their "representativeness" for all households, might suffer if households experience inflation trends that diverge from the officially published measure. Against this background and with the aim of enhancing public awareness of the scope of CPI measures, statistical agencies have tried to produce additional inflation indicators. For instance, the Austrian national statistical institute, Statistics Austria, has constructed a CPI for senior citizens, which has been published monthly since January 2006 (Kopp and Schimak, 2006). Similarly, the U.S. Bureau of Labor Statistics (BLS) publishes, and experiments with, several consumer price indices: Apart from the CPI for all urban consumers (CPI-U), which represents about 87% of the U.S. population, the BLS regularly publishes a CPI for urban wage earners and clerical workers (CPI-W).[2] The BLS has also constructed an experimental CPI for Americans aged 62 or older (see Stewart, 2008).

Households may also simply perceive that their rate of inflation is above the average or the officially published figure, even if this is not the case. Perceptions of inflation can be heavily influenced by changes in the prices of frequently purchased goods and services. A standard shopping basket might not include items an individual purchases monthly, annually or even less frequently. This could drive a wedge between actual aggregate price developments and perceived price developments. For instance, the price increases of some consumer durables (like audio-visual, photographic and information processing equipment) have been lower than average. On the other hand, the prices of frequently bought items sometimes rise at an above-average rate for prolonged periods. In Austria, the indices for items bought daily ("Mikrowarenkorb") and weekly ("Miniwarenkorb") reflect this phenomenon. The inflation rates for these basket items were higher than consumer price inflation for an extended time. Against this background, perceived inflation might be higher than the actual inflation rate, which could undermine confidence in the reliability of economy-wide measures of consumer price inflation. To make people aware of the scope and the limitations of the CPI, some statistical offices offer "personal inflation calculators" on their websites to allow consumers to interactively check how their consumption pattern affects their own inflation rate. The German, U.K. and U.S. statistical offices range among the institutions which offer this service.

For policymakers, it is relevant to clarify the distribution of inflation among households and to communicate the scope and the limitations of the CPI to prevent monetary policy from losing its efficiency, as individuals might always have some doubt about how appropriate inflation is as the core measure of price stability.

Given the relevance of accurate inflation measures for policymakers, data producers and households, it is surprising that research in this field is relatively scarce. For the U.S. population, Michael (1979) finds above-average inflation rates for the relatively poor with low levels of schooling and for older households. However, this finding is not persistent over time.

[2] *The CPI-U comprises all urban consumers; the CPI-W represents the population that derives more than half of its income from clerical or hourly wage occupations. These households account for about 32% of the total U.S. population.*

Similarly, Hobijn and Lagakos (2005) report higher inflation rates for the elderly and the poor in the U.S.A. during a more recent period. Again, the inflation difference among households is not persistent over time. For Germany, Breuer and Mehrhoff (2009), Brachinger (2008) and Tober (2008) investigate the impact of the recent increase in energy and food prices on the distribution of inflation across households but reach conflicting conclusions. Breuer and Mehrhoff as well as Tober find small differences of inflation across households while Brachinger finds large differences. This discrepancy can be partly attributed to different methodological approaches in constructing household-specific inflation rates. For the Austrian population, Russinger (2004) detects small differences of inflation across households at different income levels. Fritzer and Glatzer (2009) categorize households by their members (men/women, adults with/without children, single parents) and the income of households and find some evidence that lower-income households suffer from higher inflation.

The remainder of this article is structured as follows. In section 2, we describe the data and the methodology used, and we discuss their limitations. Section 3 presents the results based on a number of parametrical and nonparametrical estimates of different statistical objects, such as the unconditional distribution of inflation as well as conditional inflation across different subsets. Section 4 concludes the article.

2 Estimation Strategy

In the following subchapters, we discuss the approach we use to estimate household-level inflation as well as its limitations.

2.1 Data

The construction of our household-specific inflation rates is based on detailed microdata from the Austrian consumer expenditure survey 2009 – 2010 and the price index data for the Austrian national consumer price at the level of the elementary aggregates.

The 2009 – 2010 consumer expenditure survey comprises expenditures of 6,534 households over the period from the end of April 2009 to May 2010. Households had to record their expenditures during a two-week period. The data were corrected for infrequently purchased goods and services like cars or holidays, which might not fall within the two-week period. These big-ticket purchases were determined by way of face-to-face interviews and were incorporated retroactively for the last 12 months. The staggered nature of the data collection in the consumer expenditure survey during the one-year period ensures that seasonal expenditures e.g. for Christmas or at the beginning of the school year were also included.

The consumer expenditure survey is based on a sample frame restricted to dwellings where at least one person has registered the main residence as recorded in the Austrian Central Population Register. This definition excludes a subset of households, namely all households living in dwellings that are not registered as a main residence or that are not registered at all. There are various reasons for households' actual main residences not to be registered as such. For instance, students away from home may keep their main residence at their parents' address even though they are already a household of their own according to the official expenditure survey definition; others may simply have forgotten to register the address at which they actually live as their main

residence (see Albacete et al., 2012; Statistics Austria, 2011). Evidence suggests that the total number of households and the share of smaller households are underestimated as a consequence (see Fessler et al., 2012). The underestimation might be relevant for measuring household inflation, as consumption bundles might differ substantially depending on household size.

The consumer expenditure surveys are the main source for gathering information on the households' consumption bundles, which are then used to compute the weights for consumer price indices. Large revisions of these weights therefore occur only every five years (the frequency of the consumer expenditure surveys). In the interim, smaller changes occur, e.g. when a product disappears and is replaced (Statistics Austria, 2011b).

Price data at the level of elementary aggregates are composed of prices for well-defined products offered in different retail stores in 20 Austrian cities. The Austrian national CPI currently comprises 791 elementary aggregates for which about 40,000 individual prices in about 4,000 retail stores are collected on a monthly basis. The representative goods are revised every five years and are kept up to date annually at a more disaggregated level (Statistics Austria, 2011b).

The consumer expenditure survey is our only source for the weights used to construct the inflation rates at the individual household level. Other sources (for instance the national accounts), which are used as data sources for the economy-wide weights of the Austrian CPI, do not contain any information at the household-specific disaggregation level. However, as these sources do not refer to the same target population as the consumer expenditure survey, relating them to a consumer expenditure survey would be generally questionable even if our focus were on an aggregate measure of inflation for households. For example, people living in retirement homes are part of the national accounts household sector. First, they might have consumption patterns that are structurally different from those of average persons in the consumer survey's reference population of households living in registered main residences, and second, all households living in institutions are excluded from the consumer survey's reference population. Furthermore, the national accounts household sector also includes other entities that do not qualify as households, e.g. the self-employed, nonprofit organizations serving households (such as the Red Cross) and private foundations; they are also likely to have consumption patterns that differ from those of average households.

Price and consumer expenditure data have to be matched to construct inflation at the household level. Household expenditures are classified according to the COICOP (classification of individual consumption by purpose) system. The consumer price basket, however, matches the COICOP classification only at the four-digit level, which is not a breakdown to the elementary aggregate level. For instance, the consumer expenditure item "cheese" has corresponding price data at the level of elementary aggregates for seven varieties (Swiss cheese, gouda, hard cheese, camembert, fresh cream cheese and mozzarella). As a consequence, we decided to construct the price weights at the aggregation level of the four-digit items.

The consumer expenditure data also provide information about household characteristics (such as size), regional information and information about household income and some socioeconomic characteristics of the household members.

2.2 Definition of Household-Level Inflation

We observe a sample of households, $i \in I$, as well as their consumption shares, s_i^c, where $c=1,2,...,C$ is the set of COICOP four-digit consumption categories (henceforth referred to as consumption categories), which sum up to the household's total consumption expenditure,

$$\sum_{c=1}^{C} s_i^c = 1 \; \forall i.$$

Average prices of consumption categories in the set C at time t are denoted as p_t^c, and consumption category inflation between time $t-1$ and t is defined as

$$\pi_t^c := \frac{p_t^c}{p_{t-1}^c} - 1 .$$

Under the assumption that the consumption shares s_i^c stay constant over time, i.e. that households do not adapt their consumption bundles over time, their inflation is the sum of the category inflation rates π_t^c weighted by their consumption shares s_i^c Inflation rates at the household level are consequently defined as

$$\pi_{i,t} := \sum_{c=1}^{C} s_i^c \pi_t^c .$$

2.3 Limitations of the Approach

Of course, the assumption that the consumption shares of households stay constant over time is not realistic, as households will adapt their consumption bundles to price changes, income or other shocks or simply because their preferences change. However, the consumption basket information collected by the Austrian consumer survey is the main source of information on consumption baskets for as long as five years for all CPI calculations produced for official inflation statistics. As we use yearly prices at the COICOP four-digit level, we also take into account all yearly adaptions of the consumption baskets made for the calculation of official CPI below the four-digit level in our analysis. If a certain product (e.g. a specific toothpaste) is exchanged for a similar product (in the same four-digit COICOP category) due to a sharp shift in demand, our analysis reflects this exchange.

Another reason for concern is that consumption patterns of every household are surveyed only for a two-week period that differs from household to household over a full year. This implies that during this two-week period, some households might consume certain goods they do not consume regularly, like cars or other consumer durables; therefore, the resulting estimate of the annual household-level inflation rate is biased toward the inflation rates of these categories. Other households might not consume items in certain categories during the two-week observation period that they normally consume. For such households, the household-level inflation rate is biased toward the goods they do not consume regularly. Even though the consumer survey tries to take this factor into account by asking retrospective questions about the past 12 months, some biases might remain, e.g. the recall bias. However, these biases should offset each other, such that mean inflation over all households is unbiased, which is the concept on which the average consumption basket to calculate the official CPI measure is based. The same will be true for those subsets of the population that are large and homogeneous enough. Official statistics often deliver such averages over certain weighted categories, such as the weekly or daily consumption basket, and less often also averages across certain subgroups, for example the price index for retired persons. However, the bias of the estimate of a yearly mean inflation rate among such a subset of households increases the smaller the

chosen subset is, as the sampling error from the short two-week observation period will rise.

Our goal, however, is not different than that of CPI calculation. After having calculated household-level inflation, we wish to assess its mean among different subgroups, such as occupational subgroups, as well as its relationship to household characteristics such as household income. In that sense, our application can be viewed as a type of decomposition of CPI inflation or the average consumption basket into the different consumption baskets with which certain subgroups are confronted.

3 Results

Once the household-level inflation rate has been calculated, we are interested in several statistical objects, such as its expected value or mean $E[\pi_{i,t}]$ (which should be close to CPI inflation), its quantile function

$$Q(p) = F^{-1}(p) = \\ = \inf\left\{\pi_{i,t} \in \mathbb{R} \mid F(\pi_{i,t}) \geq p\right\} \forall\ p \in [0;1],$$

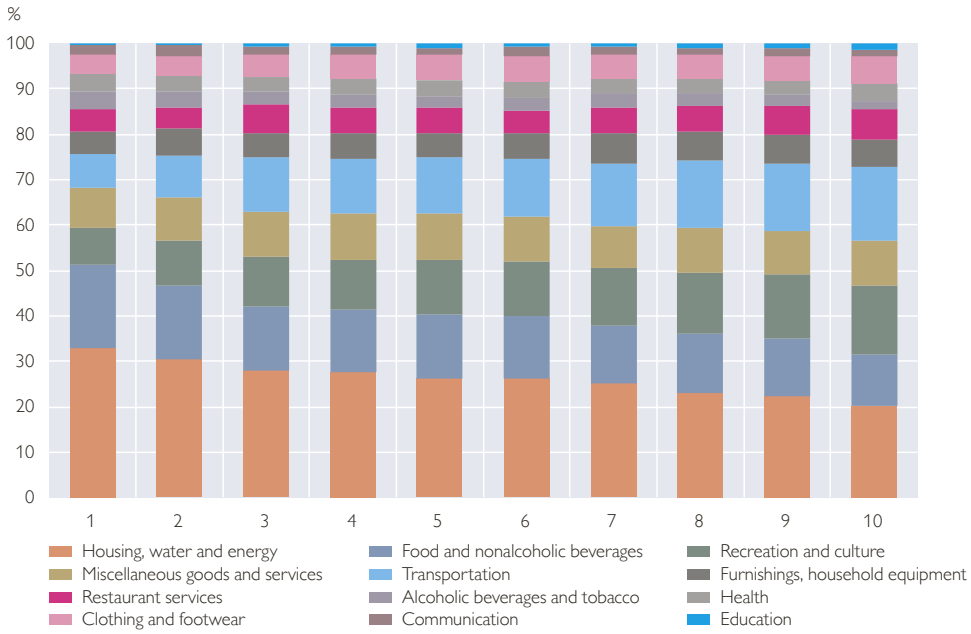
or expected values over certain subsets of the population or consumption categories $E_{i \epsilon J}[\pi_{i,t}]$ or $E_{c \epsilon K}[\pi_t^c]$, where $J \epsilon I$ and $K \epsilon C$ are subsets of the population set I or the set of categories C. In other words, we investigate which type of household is confronted with which level of inflation.

3.1 Consumption Shares

Chart 1 shows average consumption bundles aggregated at the COICOP 2 level across the deciles of household income. Whereas the shares spent for housing, water and energy, food and nonalcoholic beverages as well as alcoholic beverages and tobacco clearly decrease as income rises, those for recreation and culture, transportation, clothing and footwear as well as educa-

Chart 1

Consumption Shares over Household Income Deciles



Source: Consumer Survey 2009/10, Statistics Austria, OeNB.

tion increase. Patterns are less pronounced for the other categories.

As table 1 indicates, the inflation rates of the two-digit COICOP categories already show large variations. It also provides official CPI and HICP figures for inflation and COICOP two-digit share-weighted inflation (official COICOP two-digit inflation weighted with the raw two-digit shares resulting from the mean consumption COICOP two-digit bundle from the consumer survey). Note, however, that within each of the two-digit bundles, there is still a lot more variation, which translates into different household-level inflation rates for the different consumption bundles of households. Within the category nutrition and nonalcoholic beverages, the price e.g. for bread can still increase much more than the price for other items in the category, and households who consume a higher share of bread will experience relatively higher inflation, even if the overall share of expenditure on nutrition and nonalcoholic beverages of those households might be unchanged. To a large degree, we account for this phenomenon by using the COICOP four-digit classes, which themselves disaggregate consumption into 103 categories.

Table 1

Inflation over COICOP Two-Digit Categories

	2010	2011	2012
Food and nonalcoholic beverages	0.5	4.2	3.2
Alcoholic beverages and tobacco	2.0	4.1	2.4
Clothing and footwear	1.1	2.9	1.3
Housing, water and energy	2.6	3.2	3.2
Furnishings, household equipment	1.2	1.7	2.3
Health	1.6	1.9	1.5
Transportation	3.4	5.6	2.6
Communication	1.9	0.9	–0.1
Recreation and culture	0.8	2.0	1.0
Education	–4.7	4.1	4.4
Restaurant services	1.1	3.6	2.7
Miscellaneous goods and services	2.8	3.2	2.9
CPI	1.9	3.3	2.4
HICP	1.7	3.6	2.6
COICOP two-digit share-weighted inflation	1.9	3.4	2.5
COICOP two-digit share consumption-weighted inflation	1.9	3.4	2.5

Source: Statistics Austria, OeNB.

3.2 The Unconditional Distribution of Inflation

Chart 2 shows the quantile function of the household-level inflation rate 2012. Mean inflation was 2.21% and median inflation slightly higher at 2.23%. Roughly 51 % of all households were confronted with higher than average inflation. Whereas the values of median and mean inflation were relatively close together in 2012, meaning that the distribution of inflation among Austrian households is slightly negatively skewed, the dispersion around the median is relatively large. Whereas nearly 40% of the household population experienced inflation of less than 2%, inflation exceeds 3% for around 15% of the population.

The relatively robust P90/P10[3] measure already comes to 2.5, implying that the household at the edge of the 10% of households with the highest inflation experiences an inflation rate that is around 2.5 times higher than the household at the edge of the 10% of households with the lowest inflation. This dispersion around the median is a good measure of how representative CPI inflation is for households. Skewness is also relevant. The stronger the negative skew of the distribution is, the more households there are for which official CPI inflation is only a lower bound, given their consumption bundle.

[3] *The ratio of the 90th to the 10th percentile is a robust (in a Huber 2003 sense) measure of variation (see Cowell and Victoria-Feser, 1996).*

From 2010 to 2012, the distribution was always negatively skewed, and dispersion was decreasing.

However, the fact that household level inflation is heterogeneous does not tell us anything about which households have relatively high or relatively low inflation rates.

3.3 Bivariate Analysis

Chart 3 shows parametric and nonparametric estimates of the relationship between income and inflation. We use a simple univariate linear regression as well as a kernel regression to regress the micro inflation rate on the cumulative distribution function (CDF) of household income.

The income-inflation relationship is negative and stable along the full income distribution, as the kernel regression line resulting from 6,534 local regressions is very close to the linear regression line. At the lower tail of the income distribution, the negative relationship is estimated to be somewhat stronger and at the upper tail somewhat weaker than that of the linear regression. The higher household income is, the lower the inflation that the household experienced in 2012.

Of course, this pattern changes over time depending on the distribution of price changes across different goods. If the prices of goods representing a high share in the consumption baskets of higher-income households would rise relatively faster than other prices, the relationship would be positive.

As table 2 shows, however, the negative relationship was very stable at least from 2010 through 2012. All coefficients are negative and highly signifi-

Table 2

Relationship between Inflation and Income

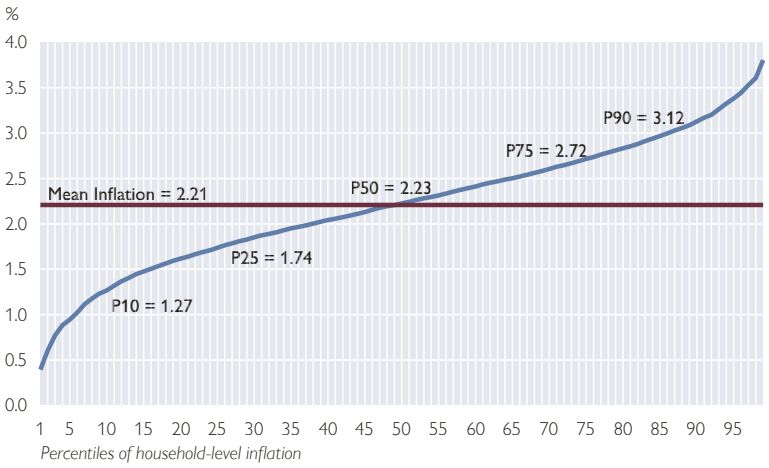
	Coefficient	Standard error
2010	–0.601	0.065
2011	–0.191	0.064
2012	–0.603	0.037

Source: Consumer Survey 2009/10, Statistics Austria, OeNB.

Note: This table shows the coefficients and standard errors of linear regressions (including a constant) of household-level inflation rates on the cumulative distribution function of household income.

Chart 2

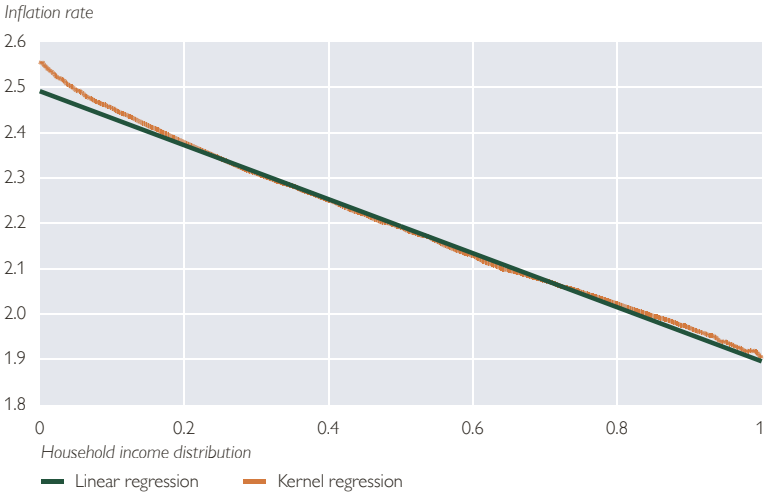
The Distribution of Inflation among Austrian Households (2012)



Source: Consumer Survey 2009/10, Statistics Austria, OeNB.

Chart 3

Parametric and Nonparametric Estimations of the Relationship between Income and Inflation



Source: Consumer Survey 2009/10, Statistics Austria, OeNB.

cant (at the 1% level[4]), implying that from 2010 to 2012, lower-income households where always confronted with higher than average – or official CPI – inflation, whereas higher-income households experienced less inflation, given their consumption bundles. This pattern mainly results from the fact that housing and energy as well as food and beverages, whose prices rose faster than average inflation during the period, represent a higher share in consumption baskets of lower-income households than of higher-income consumers. However, as food prices – at least those at the COICOP 2-digit level – did not rise more strongly than average inflation in 2010, higher food prices cannot be the only reason lower-income households experienced higher inflation.

A coefficient of –0.60 (for 2012) translates into an inflation rate that is around 6 basis points lower for every decile up the income distribution. In the period since the beginning of the crisis (2008 to 2012), this relationship was always negative and came to between 2 basis points (2011) and 8 basis points (2009) for each income decile.

This implies that to keep real incomes stable in 2012, not all incomes should be increased by 2.21%. Lower incomes would need to be increased more, (e.g. incomes at P10 would need to be raised by 2.45%) and higher incomes would need to be raised less (e.g. incomes at P90 would need to be increased by 1.97%). An across-the-board increase in incomes by mean (or official CPI) inflation leads to real income losses for lower-income households and real income gains for higher-income ones.

Table 3

Medians of Inflation by Income Deciles as a Percentage of Overall Median Inflation

	2010	2011	2012
1	125	104	118
2	123	106	112
3	120	105	108
4	102	99	100
5	104	103	101
6	103	102	98
7	91	94	95
8	83	94	93
9	71	93	92
10	74	96	90

Source: Consumer Survey 2009/10, Statistics Austria, OeNB.

Table 3 illustrates this relationship in terms of relative to median household-level inflation rates. It shows the inflation rate for the respective household income deciles measured as a percentage of median inflation. Higher-income households experienced around 70% to 90% of median inflation, compared with around 100% to 120% for lower-income households. The pattern is very stable over all three years in the observation period, even though it was less pronounced in 2011. As households have a tendency to stay in their deciles or to move only slowly, these differences between yearly inflation rates accumulate over the years, further increasing real income divergence.

[4] *Note that all the given standard errors in this paper result from weighted estimations (using given household weights) using the consumer expenditure survey including the merged household-level inflation rates. The survey does not include any information that allows us to take the spatial proximity of households in the consumption survey sampling scheme to those in the microcensus into account. However, only two to three households in the gross sample live close to microcensus households and because the unit response rate is 38%, this number is often even smaller. Therefore, differences for estimation of standard errors are likely to be negligible. The method for imputing income in the consumption survey is such that the true variation is likely to be underestimated. Furthermore, the merged price data is not gathered via probability sampling. All of these factors may contribute to an underestimation of standard errors.*

Table 4 shows mean household-level inflation rates across different household characteristics.

As municipality size increases, so do household-level inflation rates, rising from 2.10% in small villages (fewer than 5,000 inhabitants) to 2.37% in the largest municipality, Vienna. This relationship does not reflect different regional price developments, but rather the different consumption baskets of different household types across municipalities of various sizes have. One-person households (estimated at roughly 36% of all households) have average consumption bundles that correspond to inflation of 2.37%, whereas inflation decreases for larger households, down to 2.10% for households with five or more members. By household type, inflation is especially high in single-parent households that do not include any other adults (2.43%).

Table 4

Household-Level Inflation and Household Characteristics

	Household population share in %	Household-level inflation rate	Standard error
Municipality size			
≤5,000 inhabitants	39.7	2.10	0.02
5,001-10,000 inhabitants	12.4	2.15	0.03
10,001-50,000 inhabitants	13.8	2.24	0.03
50,001-100,000 inhabitants	2.6	2.29	0.07
>100,000 inhabitants	8.2	2.26	0.03
Vienna	23.3	2.37	0.02
Household size			
1	35.7	2.37	0.02
2	28.6	2.16	0.02
3	16.0	2.12	0.03
4	12.9	2.05	0.02
5+	6.8	2.10	0.03
Household type			
One Person	35.7	2.37	0.02
Couple with children	30.3	2.06	0.02
Couple without children	24.6	2.13	0.02
Single parent (the only adult)	3.2	2.43	0.04
Single parent (not the only adult)	3.1	2.25	0.05
Other	3.0	2.08	0.07
Household main residence			
Owner	51.0	1.88	0.01
Renter (public housing apartment)	8.1	2.58	0.04
Renter (housing association apartment)	17.0	2.58	0.02
Renter (private rental property)	15.2	2.57	0.03
Other (free use, cooperation housing, etc.)	8.7	2.46	0.04
Risky assets (at least one household member holds stocks or bonds)			
Yes	23.7	2.03	0.02
No	76.3	2.27	0.01
Vacation (maximum number over all household members in the past 12 months)			
0	43.8	2.39	0.02
1	31.9	2.14	0.02
2	13.4	2.05	0.03
3+	10.9	1.88	0.03
Total	100.00	2.21	0.01

Source: Consumer Survey 2009/10, Statistics Austria, OeNB.

Table 5

Household Level Inflation and Personal Characteristics of the Main Earner in the Household

	Household population share in %	Household-level inflation rate	Standard error
Age			
up to 29	9.1	2.29	0.04
30 to 39	16.9	2.19	0.03
40 to 49	23.4	2.14	0.02
50 to 64	26.2	2.16	0.02
65 and older	24.3	2.31	0.02
Education			
At most primary	17.0	2.40	0.03
Lower secondary	52.2	2.21	0.01
Higher secondary	17.0	2.12	0.03
Tertiary	13.7	2.06	0.03
Occupation			
Other not employed	2.4	2.39	0.07
Unemployed	3.6	2.38	0.07
Retired	32.4	2.30	0.02
Other employed	0.7	2.28	0.19
Blue collar	15.4	2.24	0.02
White collar	31.6	2.14	0.02
Self-employed	5.4	2.12	0.04
Civil servant	6.2	2.04	0.04
Farmer	2.2	1.87	0.06
Total	100.00	2.21	0.01

Source: Consumer Survey 2009/10, Statistics Austria, OeNB.

Inflation is significantly lower for households that own their main residence (1.88%), whereas inflation comes to approximately 2.58% for households that rent their main residence. Holding risky assets as well as a higher frequency of vacation can be seen as indicators of higher household wealth. Households that hold risky assets experience significantly lower inflation rates, and inflation decreases as the frequency of vacations in the household increases. Both signal a negative relationship between inflation and wealth, which is consistent with the income findings.

Table 5 shows household-level inflation across personal characteristics of a reference person. Of course, choosing one person as a representative of the household is always arbitrary. We chose the main earner in the household.

Inflation is higher in households with a very young or retired main earner and therefore shows a clear u-shaped pattern with regard to the age of the main earner. At the same time, these households are somewhat smaller than average. Education is also negatively correlated with inflation. The higher the education level of the main income earner in the household is, the lower the inflation rate is, given the household's consumption bundle.

Broken down by occupation, inflation is highest among nonworking households, i.e. the unemployed (2.38%) and the retired (2.30%). Among households with a working main income earner, blue-collar workers had the highest inflation (2.24%), followed by white collar workers (2.14%) and the self-employed (2.12%). Civil servants (2.04%) and especially farmers (1.87%) experience significantly lower inflation rates than blue-collar workers.[5] Like the income pattern, the occupational pattern was relatively stable over the 2010 to 2012 period. The ranking by household-level inflation was stable from 2010 to 2012 for households with working main income earners.

3.4 Multivariate Analysis

To examine the correlations between household-level inflation and different household characteristics not only with a bivariate but also with a multivariate analysis, we estimate the conditional expectation function (CEF) of household-level inflation $E[\pi_{i,t}|X_i]$, where X_i consists of household characteristics of household i. If the CEF is linear, a multivariate linear ordinary least

[5] *The small but heterogeneous groups "Other employed" and "Other not employed" are included only for the sake of completeness.*

squares regression (OLS) is the best predictor for this statistical object. Even in the likely case that the CEF is not linear, an OLS regression remains the best linear approximation of the CEF. Analogously, we are interested in conditional quantile functions $Q_{\pi_{i,t}|X_i}(p)$ and use quantile regressions for estimations (see Koenker and Basset, 1978). In our case – where due to the nature of the data collection (two weeks per household) outliers of $\pi_{i,t}$ might occur and the mean and median are very close in our dataset – quantile regression for the median is a reasonable robustness check with regard to OLS. Additionally, we estimate quantile regressions for the 20th and 80th percentile to investigate the robustness of the results also along the distribution of household-level inflation. It is important to note that clearly, all these estimations and resulting parameter estimates are purely descriptive and that no causal interpretation is in order.

The resulting parameter estimates and standard errors of the OLS and quantile regressions (P20, P50, P80) are shown in table A1 in the annex. The results of the OLS regression shown in chart 4 illustrate that household-level inflation is lower for higher-income households. While in the bivariate case, inflation decreases by 6 basis points per income decile, it decreases by 4 basis points in the multivariate case and is significant at the 1% level. The household types couples (12 basis points) as well as couples with children (12 basis points) experience significantly lower inflation (at the 1% level) than one-person households, which serve as a reference category. The only household type which has significantly higher household-level inflation (at the 1% level) than one-person households is the single-parent household with no other adult living in the household (11 basis points). With regard to education of the main earner, maximum primary education[6] serves as reference category and lower secondary (9 basis points) as well as higher secondary (17 basis points) and tertiary (18 basis points) are associated with significantly lower inflation (at the 1% level). By occupation of the main earner, civil servants (10 basis points) as well as farmers (29 basis points) have significantly lower inflation than the retired, which serve as a reference category. Further F-tests between the coefficients of the household with a working main earner show that while blue-collar workers are not significantly different from white-collar workers or the self-employed, all other households with a working main earner have significantly higher household-level inflation than farmers.[7]

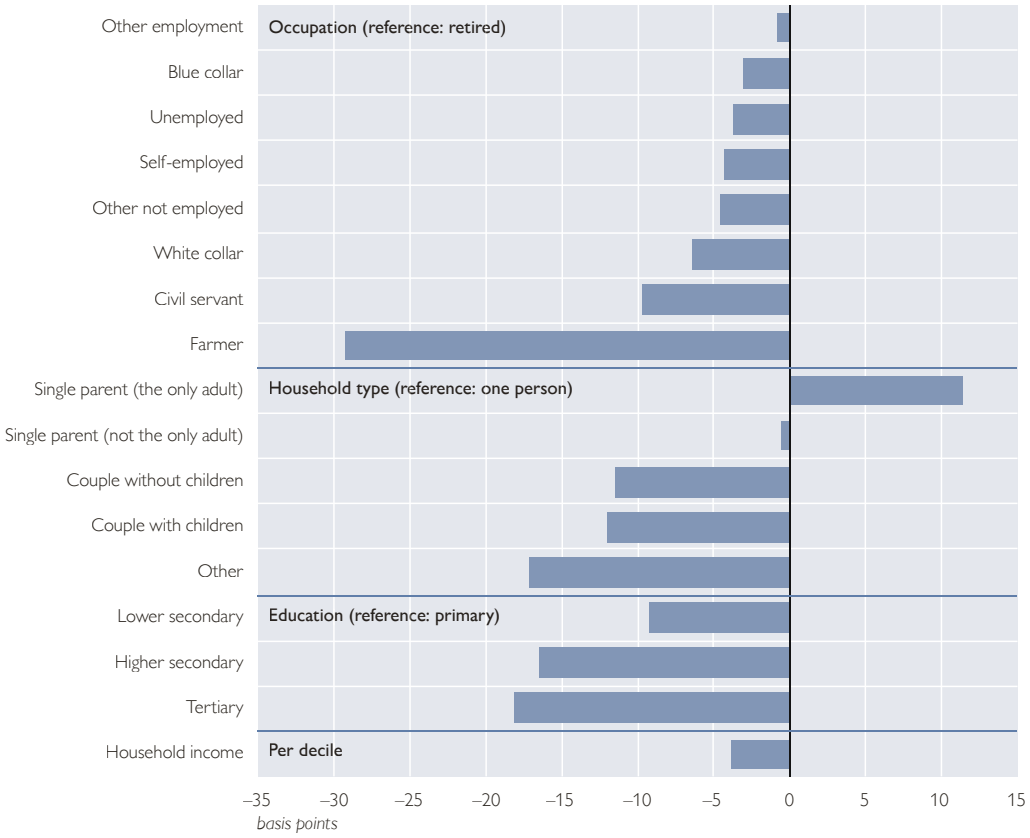
All of the OLS results hold using the more robust quantile regression at the median. Furthermore, the results are even somewhat more pronounced in terms of size and significance of the coefficients. At lower levels of the distribution of household-level inflation (P20), the effects for lower education, couples with children and civil servants lose statistical significance. At the

[6] *Primary education refers to the consumer survey education categories "maximal Pflichtschule"; lower secondary education to "Lehre/Berufschule, Meister- Werkmeisterausbildung, Ausbildung zum gehobenen Dienst für Gesundheits- und Krankenpflege, berufsbildende mittlere Schule"; higher secondary education to "allgemeinbildende und berufsbildende höhere Schule"; tertiary education to "Universität, Fachhochschule und hochschulverwandte Ausbildung, Akademie."*

[7] *Note that we also include age as a further control variable. However, as we include household type and occupation (including the retired), the age control only additionally covers average age effects remaining inside those cells heavily correlated with age and should not be interpreted as an age pattern.*

Chart 4

Conditional Differences in Household-Level Inflation at the Mean (OLS)



Source: Consumer Expenditure Survey 2009/10, OeNB.

Note: This table shows regression coefficients resulting from an OLS regression of household-level inflation on household characteristics. Age control and a constant are omitted. See annex for the detailed results (coefficients and standard errors) as well as the results of analogous quantile regressions.

upper part of distribution (P80), the results are closer to the middle. Results for all households except single-parent households stay significant.

All in all, the results show a robust and highly significant negative relationship between income and inflation (between 3.5 and 4.8 basis points for each income decile) for households that are a couple without children (between 8 and 12 basis points lower than the result for one-person households) or whose main earner is a farmer (between 21 and 36 basis points lower than the result for households whose main earner is retired) or that have an education level higher than primary education (between 1 and 20 basis points). These relationships are significant for the mean as well as for the median and the 20th and 80th percentiles of the distribution of household-level inflation.

Furthermore, age as well as occupation (white-collar workers or civil servants) and household type (couple with children) are significantly and negatively related (OLS and median regressions) in the middle part of the distribution of household-level inflation.

4 Concluding Remarks

In this paper, we calculated household-level inflation rates based on consumption bundles measured by the consumer

expenditure survey used for the official CPI calculations and the price index data at the four-digit level provided by Statistics Austria. This statistical exercise allowed us to look behind the CPI, which is defined as inflation of an average consumption bundle. Even though such a calculation cannot deliver an exact distribution (see section 2.3) of the inflation that households experience, it gives us an idea about (1) the heterogeneity of inflation among Austrian households and about (2) correlations between certain household characteristics and the inflation these households experience.

Although these patterns are likely to change over time and more research over longer time periods would be very interesting, we find the following stable patterns at least since 2010:

Inflation decreases as household income and the education of the main earner increases. It is significantly lower for civil servants and especially for farmers than for other occupation groups. It is especially high for unemployed persons, the retired and blue-collar workers. Inflation is lower for larger households than for one-person households, with the exception of single parents (with no other adults in the household) and has a u-shaped relationship with regard to age of the main earner.

As the primary goal of monetary policy is price stability, it is crucial to know about inflation and its development. In this vein, not only mean inflation, but also other measures, such as the variance or the skewness of inflation among households might be relevant. The higher the variance of inflation is, the larger is the share of households for which CPI inflation might not be a good approximation. The more negatively skewed the distribution of inflation is, the larger is the share of households that experience inflation above the mean. Thus it might be important for policymakers to develop additional measures of consumer prices as well as other forms of inflation measures, like developments of asset prices. If monetary policymakers additionally consider the development of median inflation and the variance of inflation when pursuing their medium price stability objective, wage unions might internalize this behavior in their negotiations, which could lead to improved growth and medium-term price stability. Especially in times when interest rates are close to the zero lower bound and real interest rates are therefore negative for a large class of assets, monitoring median inflation and the inflation of the asset holdings of certain households might reveal wealth and income effects which might otherwise be overlooked. These patterns of wealth and income effects might be rather important, as they are at least partly caused by monetary policy and as they directly translate into different consumption patterns as well as a redistribution of income and wealth potentially unintended by policymakers. Even though these unintended consequences of monetary policy might be difficult to avoid, it might be useful to consider the joint distributions of asset holdings, income streams as well as inflation patterns across households to understand them and take them into account. Further research in this vein is needed.

Analyzing the interplay between consumption and household savings, a particularly relevant relationship is that of inflation and income. From an aggregate point of view, theory suggests, and several empirical studies show, that the propensity to consume out of additional income decreases as income rises. This implies that if the relationship between income and inflation – given all income increases with mean (CPI) inflation – is

negative, aggregate consumption will be lower than if inflation were distributed equally or randomly across incomes. This is the case because households with lower income will experience real income losses, whereas households with higher income will experience real income increases – even though all incomes increase at the mean inflation rate.

Using the CPI as a reference for inflation compensation in wage negotiations might be misleading. Even wage increases above the mean inflation rate might produce real income losses for low-income households. On the other hand, even if nominal income increases at a rate below the mean inflation rate, this might translate into real income increases for higher-income households, given their typical consumption patterns. Differences in wage increases are already considered in many wage negotiations. These mostly come in the form of lump-sum payments for lower income groups, caps on absolute increases or even different increases for different income brackets and are mostly driven by considerations about the needs of certain groups of employees, firm-level and market conditions or union power. However, what is missing is a systematic evaluation and general strategy with regard to different inflation rates. Taking inflation patterns across incomes or other household characteristics into account might lead to more efficient negotiation outcomes, as it would increase information about the true effects of nominal wage increases.

While recent analyses of wage and income developments in Austria (Glocker et al., 2012; Rechnungshof, 2012) show real income losses for lower incomes and real income gains for higher incomes, these results are likely to understate the real level of divergence, as the different inflation rates resulting from the different consumption bundles have not been taken into account. Not taking diverging inflation patterns into account might be especially harmful in times of lower growth because of the negative relationship between the marginal propensity to consume and income. All these arguments call for more research in this area to provide better insights into the dimensions of the heterogeneity of inflation across households and over time.

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Annex

Table A1

Descriptive Regressions of Household-Level Inflation on Household Characteristics

	OLS	Quantile regressions		
		p=0.2	p=0.5 (median)	p=0.8
Age				
Age	–0.002	–0.001	–0.003	–0.001
	(0.001)	(0.002)	(0.001)	(0.001)
Education (reference: at most primary)				
Lower secondary	–0.092	–0.065	–0.124	–0.088
	(0.032)	(0.042)	(0.032)	(0.032)
Higher secondary	–0.165	–0.116	–0.197	–0.16
	(0.041)	(0.054)	(0.041)	(0.041)
Tertiary	–0.181	–0.103	–0.199	–0.18
	(0.042)	(0.058)	(0.045)	(0.044)
Household income	–0.39	–0.346	–0.371	–0.478
	(0.052)	(0.071)	(0.055)	(0.054)
Household type (reference: one person)				
Couple with children	–0.12	–0.041	–0.109	–0.166
	(0.034)	(0.046)	(0.035)	(0.035)
Couple without children	–0.115	–0.076	–0.134	–0.098
	(0.032)	(0.042)	(0.033)	(0.032)
Single parent (the only adult)	0.114	0.207	0.112	0.023
	(0.044)	(0.085)	(0.065)	(0.064)
Single parent (not the only adult)	–0.006	0.043	–0.059	0.011
	(0.055)	(0.086)	(0.066)	(0.065)
Other	–0.171	–0.102	–0.134	–0.174
	(0.070)	(0.088)	(0.068)	(0.066)
Occupation (reference: retired)				
Blue collar	–0.031	0.039	–0.109	–0.043
	(0.045)	(0.063)	(0.049)	(0.048)
White collar	–0.064	–0.053	–0.135	–0.027
	(0.042)	(0.058)	(0.045)	(0.044)
Civil servant	–0.097	–0.033	–0.21	–0.07
	(0.049)	(0.074)	(0.057)	(0.056)
Farmer	–0.293	–0.205	–0.36	–0.29
	(0.076)	(0.108)	(0.083)	(0.082)
Self-employed	–0.043	–0.065	–0.135	0.06
	(0.055)	(0.078)	(0.061)	(0.059)
Other employed	–0.008	–0.083	0.17	0.272
	(0.199)	(0.177)	(0.137)	(0.134)
Unemployed	–0.037	–0.132	–0.027	0.053
	(0.076)	(0.090)	(0.069)	(0.068)
Other not employed	–0.046	–0.03	–0.096	0.088
	(0.082)	(0.111)	(0.085)	(0.084)
Number of observations	6,534	6,534	6,534	6,534

Source: Consumer Survey 2009/10, Statistics Austria, OeNB.

Note: Standard errors are given in parentheses.

Internet Payment Behavior in Austria

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The popularity of online shopping has risen sharply in recent years, bringing about the emergence of new forms of payment. Against this background, the OeNB conducted a survey in fall 2011 on the general payment behavior of households in Austria (payment survey). This study presents the results of this survey, focusing on Austrians' Internet shopping habits. The survey shows that in Austria 7 of 10 persons use the Internet on a regular basis. More than 60% of these Internet users have purchased goods or services over the Internet at least once. It has become apparent that the ratio of online shoppers varies greatly across sociodemographic groups. The share of online shoppers is higher among men, younger people, more highly educated people and persons living in less densely populated areas. The majority of online payments (around 50%) are made via bank-based payment services, followed by credit card payments, which account for 27% of all payment transactions. The use of Internet-specific payment methods like PayPal is still not widely accepted in Austria. However, with a share of more than 10%, the number of Internet-specific payment schemes has grown considerably compared to the results of previous OeNB studies on payments. The strong boost in e-commerce in recent years has promoted the use of payment instruments on the Internet. Therefore, online shopping will have a growing influence on payment behavior.

JEL classification: E58, D12, O33
Keywords: payment behavior, online payment means, e-commerce

The rising use of Internet services like e-mail, online encyclopedias or social networks has given the Internet a key role in everyday routines. Following this trend, shopping on the Internet has become more and more popular. It is therefore important for companies to present themselves and their goods or services via the Internet and to provide consumers with different options for online payment. Technological advances have boosted the number of such payment methods and have made paying online considerably more convenient in recent years. Internet shopping has become a promising market that is projected to grow further in the future. Consumers' concerns about user safety play a major role in their choice to purchase goods or services online.[2] The prediction that electronic money will soon completely replace traditional means of payment, which would limit central banks' possibilities to control monetary growth and inflation, has yet to be proven (Stix et al., 2006). Nevertheless, knowing about people's online payment habits is of particular importance for central banks, as central banks have the mandate to promote the smooth functioning of payment systems. In this context, this study presents the results of a survey commissioned by the Oesterreichische Nationalbank (OeNB) and conducted in the third quarter of 2011 by IFES with the aim to find out more about the payment behavior of Austrian households. This paper is structured as follows: Section 1 discusses and compares the Internet use and online shopping activities of consumers in Austria and in the EU. Section 2 outlines the results of the payment survey with a special focus on Internet

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[2] *Consumer market study on the functioning of e-commerce and Internet marketing and selling techniques in the retail of goods*
http://ec.europa.eu/consumers/consumer_research/market_studies/docs/study_ecommerce_goods_en.pdf.

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shopping habits. In section 3, recent activities of EU institutions aimed at increasing Internet security are laid out. Section 4 concludes by giving a brief summary and a short outlook.

1 Increasing Internet Use and Rise in Online Shopping

The number of Internet users and of households with Internet access has been rising since the 1990s. Consequently, the spread of Internet use in Austria and in the EU has been the subject of a large number of surveys.

1.1 Internet Access and Use in Austria and European Countries

One goal formulated in the Lisbon Strategy was to make the EU "the most competitive and dynamic knowledge-based economy in the world," which includes developing a successful information society. To monitor the implementation of this goal, Eurostat – in collaboration with the national statistical offices (in Austria: Statistics Austria) – organizes two annual Community Surveys to collect data on the development of an EU-wide information society.[3] To guarantee comparability at the European level, a standardized methodology and standardized definitions are used.[4]

According to these surveys, the percentage of households with Internet access as well as the share of Internet users varies greatly within Europe. Table 1 provides comparative data on Internet access and use across the EU as a percentage of households (Internet access) and persons (Internet usage). Internet penetration is found to be highest for Northern and Northwestern European countries and lowest for Southern and Southeastern European countries. In 2012, the highest rates of Internet use were observed in the Netherlands (100%), followed by Norway (95%) and Sweden (93%); while the lowest rates were recorded in Romania (46%), Bulgaria, Italy and Greece (around 55%). The respective rates for households with Internet access are distributed equally. In Austria, 80% of survey respondents said they used the

Table 1

Internet Use across Europe in 2012

Share of households with Internet access		Share of persons who used the Internet during the previous three months	
% of households or individuals			
Netherlands	94	Netherlands	100
Norway	93	Norway	95
Luxembourg	93	Sweden	93
Sweden	92	Denmark	92
Denmark	92	Luxembourg	92
Finland	87	Finland	90
United Kingdom	87	United Kingdom	87
Germany	85	Germany	82
Ireland	81	Belgium	81
France	80	France	81
Austria	**79**	**Austria**	**80**
Belgium	78	Estonia	78
Malta	77	Ireland	77
Euro area	76	Slovakia	77
EU-27	76	Euro area	74
Estonia	75	EU-27	74
Slovakia	75	Czech Republic	73
Slovenia	74	Latvia	73
Poland	70	Hungary	71
Hungary	69	Spain	70
Latvia	69	Malta	68
Spain	68	Slovenia	68
Czech Republic	65	Lithuania	67
Italy	63	Poland	62
Lithuania	62	Cyprus	61
Cyprus	62	Portugal	60
Portugal	61	Italy	56
Greece	54	Greece	55
Romania	54	Bulgaria	52
Bulgaria	51	Romania	46

Source: Eurostat. 2012. Individuals – Internet use. IKT-Einsatz in Haushalten 2012 (retrieved on July 23, 2013).

[3] *Surveys on the usage of information and communication technologies (ICT) in enterprises (e-commerce) and surveys on ICT usage in households and by individuals.*

[4] *The survey regarding households' Internet usage is a sample survey that comprises households with at least one household member aged 16 to 74.*

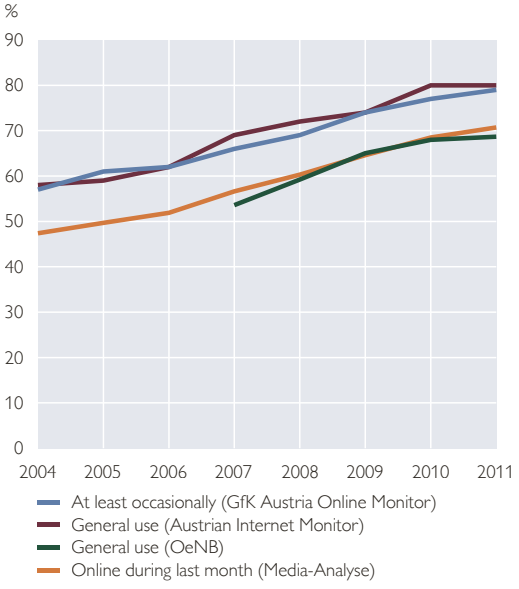
Internet, and eight out of ten households said they had Internet access. This means that the rates for Austria are slightly above the EU-27 average rates (76% for Internet access and 74% for Internet use).

A wide range of other studies about Austrian households' Internet use have been written. However, since the surveys these studies are based on differ in the type of questioning, the way of sampling and the timeframe the questions refer to, their results are only comparable to some extent. Based on data provided by GfK Austria Online Monitor, chart 1 shows how the share of the population that uses the Internet at least occasionally has developed over the last few years (left-hand panel, blue line). In 2011, 80% of respondents said they used the Internet compared to 50% in 2002. Similar results were observed by the Austrian Internet Monitor (purple line), whereas data provided by the OeNB payment survey and the OeNB payment card-surveys[5] and a related survey carried out by Media-Analyse deviate considerably from the other surveys mentioned before. In contrast to the Media-Analyse survey, which refers to Internet use during the last month preceding the survey, the OeNB payment card survey analyzes Internet use in general. According to both surveys, around 70% of Austrian households use the Internet, which is 10 percentage points below the results of surveys conducted by GfK Austria and the Austrian Internet Monitor. Despite these differences, it is fair to

Chart 1

Internet Use in Austria

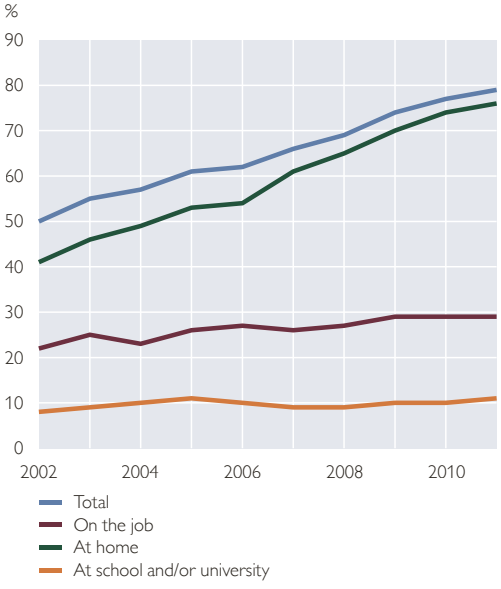
Frequency of Internet Use



Source: GfK Austria, Integral, Media-Analyse, OeNB.

Note: The data refer to persons aged 14 and over.

Internet Use by Location of Access



Source: GfK Austria.

Note: The data provided by the European Commission refer to the population aged 15 and over. All other data presented refer to the population aged 14 and over. Media-Analyse data refer to the entire year.

[5] *The payment card survey commissioned by the Oesterreichische Nationalbank (OeNB) collects data on payment card ownership and the use of payment instruments on a frequent basis.*

assume that general Internet use in Austria has at least surpassed the 70% mark and is still on a steady upward trend. The data support the assumption that Internet users use the Internet on a frequent basis.

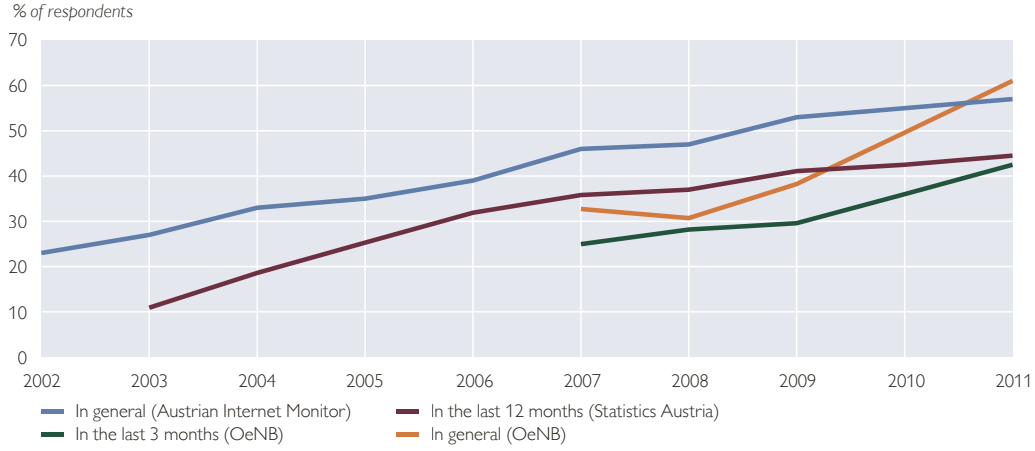
The right-hand panel of chart 1 shows the locations from which Austrians access the Internet. The data – based on a sample of 4,000 people aged 14 years or older – are taken from GfK Austria and were collected on a quarterly basis. 76% of the respondents said they used the Internet at home (green line), 29% opted for "at work" and 11% for "at school or university." The data show that the rise in the rate of Internet use over the past few years mainly results from an increase of Internet use at home, as figures for Internet use at work or at school and/or university have been stagnating. According to GfK Austria, the number of Austrians aged 14+ is about 7.1 million, which means that, in 2011 approximately 5.4 million Austrians used the Internet at home, 2.1 million used it at work and 0.8 million at school and/or university.

1.2 Online Shopping in Austria

The various surveys also provide information on the extent of online shopping in Austria. For the reasons mentioned above, the online shopping figures are comparable only to a limited extent. In line with the rise of Internet use in Austria, the popularity of online shopping has increased over the past few years. The reasons for this development are the increasing number of Internet users and mobile phone users (in particular among young consumers), technological advances, and more frequent use of online banking facilities. Online banking is of special interest, as having an online banking account is a necessary precondition for using a variety of online payment methods. Data for the third quarter of 2011 provided by the OeNB payment survey show that more than 52% of respondents use online banking, and more than 32% use it on a frequent basis. As illustrated in chart 2, the rate of online shopping increased from 23% of respondents in 2002 to 57% in 2011 (blue line). These data stem from the Austrian Internet Monitor and indicate the share of people who have

Chart 2

Online Purchases in Austria



Source: Integral, OeNB, Statistics Austria.

Note: OeNB data for 2010 are estimated.

bought goods or services over the Internet at least once. This result is consistent with data collected during the OeNB payment survey. According to the latter, more than 60% of respondents have purchased goods over the Internet at least once (42% in the last three months). In a survey conducted by Statistics Austria (purple line), 45% of persons aged 16 to 74 years reported that they purchased goods or services over the Internet in 2011.

A look at the supply side shows that companies are also increasingly taking into account consumer demand: In 2010, 50% of retail companies in Austria had their own websites and 15% operated an online store, generating a total turnover of EUR 1.6 billion – this means that compared to 2006, the number of online stores went up by 75% and revenues augmented almost threefold (KMU Forschung Austria, 2011).

2 Survey Results

2.1 Some Remarks on the Methodology Applied

The OeNB payment survey included a detailed questionnaire as well as a "payment diary" in which respondents were asked to record the payments they had made for purchases of goods and services in the week preceding the survey, providing details on the respective payment amounts, means of payment as well as the sector to which the good or service purchased could be assigned. While the payment survey provided data on payment habits in general, the analysis in this paper is limited to online payment-relevant data.[6]

The sample surveyed comprised 2,271 households, 1,165 of which sent back a payment diary. Given incomplete entries in some of these payment diaries, the statistical analysis in this study was conducted on the basis of 1,138 payment diaries. Of these 1,138 households, 7.3% stated that they had ordered goods or services over the Internet at least once within the week in question. With a total of 125 transactions generating a payment volume of EUR 9,342.08, the online transactions recorded in that week account for roughly 1.1% of all direct payment transactions and 3% of the value of all payments recorded in the payment diaries. Table 2 presents the descriptive statistics with regard to the payment values of the online transactions carried out in the observation period in fall 2011.

With a mean payment volume of EUR 74.7 and a median of EUR 50, it is evident that the payment volume of online transactions recorded in the sample was not very high. Furthermore, we can deduct that the use of online transactions was more frequent for payment volumes below the mean of EUR 74.7. Among the group of online shoppers surveyed, 66.7% stated that they had bought goods and services online once, 22.6% twice and 10.7% three times or more in the observation period.

As the amount of payment diary data was sparse, these results should be

Table 2

Distribution of Online Payments[1]

	EUR
minimum	0.79
p5	9
p25	22.9
median	50
mean	74.7
p75	100
p90	150
p95	225
maximum	470

Source: OeNB Payment Survey, 2011.

[1] Statistical indicators: variance 5,906.35; skewness: 2.62; kurtosis: 12.32.

[6] *For a more general analysis, please refer to Mooslechner et al. (2012).*

interpreted with caution and, if possible, in comparison with the results of other related studies.

2.2 Use of Internet-Specific Payment Schemes still not Widespread in Austria

Given the speedy development of innovative means of payment as well as the increasing use of online shopping, the OeNB decided to evaluate which means of payment people tend to use when shopping online. To arrive at a complete picture of online payment practices in Austria, the results presented in this section are based on the answers given in the general questionnaire of the OeNB payment survey as well as on data gathered in the payment diaries.

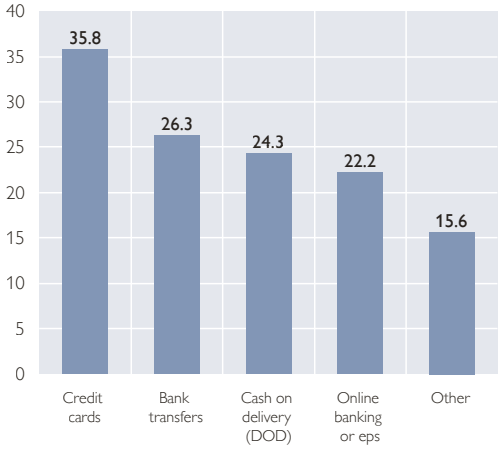
According to the questionnaire, 60% of respondents have ordered goods or services via the Internet at least once so far. The results show that to pay for their online purchases, 35% of respondents used their credit cards. Around one-quarter paid by bank transfers using a paper form to initiate transactions.[7] With a share of 24% in total payments for online, paying cash on delivery (COD) is still relatively common in Austria. This might be a side-effect of the general high level of cash use in Austria. The study Mooslechner et al. (2012) shows that cash is the most important payment instrument, accounting for 82.1% of transactions and 65.3% of the total payment volume. The fourth-highest rate, at more than 20%, is recorded for online banking, including credit transfers made electronically and transactions made by eps Online-Überweisung (an Austrian online bank transfer scheme). All other payment options (including payments via mobile phone, PayPal, Paybox) were used by less than 10% of respondents. This might indicate these options are not yet well known and that their acceptance by online shops is comparatively low.

As the use of Internet-specific payment schemes is still not widespread in Austria, the degree of brand awareness on the one hand and the actual use of online payment methods on the other hand are of major interest. The results show that the best known Internet-specific payment instruments are PayPal and Paybox (each 38%); however, only 9% (PayPal) or 4% (Paybox) of respondents claimed to actually have used the respective service. 28% stated that they had heard of eps Online-Überweisung and 14% that they had already used this e-payment scheme. Thus, eps Online-Überweisung proved to be the most widely used Internet payment service, but not the best known. The high usage of eps Online-Überweisung could be caused by the fact that it relies on the

Chart 3

Use of Online Payment Methods in Austria

% of persons who purchased goods or services over the Internet in 3 months prior to the survey



Source: OeNB.

Note: The chart shows data for 2011.

[7] *For bank transfers, the payment form is submitted together with the bill and the good is delivered to the buyer by mail.*

infrastructure of Austrian banks, which means that account holders at every Austrian bank providing this service can use eps Online-Überweisung for all online merchants that accept this payment method. To use PayPal, by contrast, consumers must first register for this particular service and open a payment account with PayPal.

2.3 Payment Diary Data Show that Bank Transfers Remain Most Popular Payment Method

The results of assessing the payment diary data show that – against previous studies conducted by the OeNB – bank transfers remain the most popular payment method for online purchases: 50% of online payments are made by using payment forms or direct debit (chart 4). With credit cards currently being used for around 30% of online payment transactions, around 80% of all online payment transactions are made using only two methods of payment. In Austria, paying cash on delivery is still very popular and constitutes the largest component among the payment methods summarized as "Other" in chart 4. When comparing the results with those of previous studies, cash-on-delivery transactions remained relatively stable. Internet-specific payment methods like "eps Online-Überweisung" and PayPal increased considerably compared to the findings of previous studies and account for 11.3% of all online payment transactions.

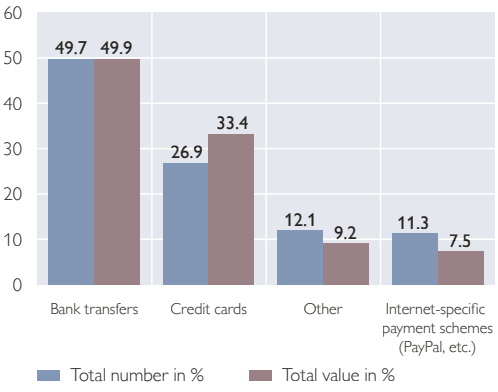
In a breakdown by payment amounts, the shares of payment methods are distributed analogously to the number of payment transactions. Again, bank transfers have the highest share (around 50% in total transaction value). The share of credit card transactions comes to roughly one-third of the total value of transactions. While for payments at traditional retail outlets, the share of credit card payments in the total transaction value is far higher than the share in the number of transactions, which indicates that credit cards are primarily used for larger-value amounts, this is not the case for online payments. For online shopping purposes, credit cards are also used for smaller amounts. Payments by Internet-specific payment schemes accounted for 8% of the total value of online payment transactions.

The relation between payments amount and payment methods also provides further insight into the way online payment schemes are used. Apparently, for small-value payments up to EUR 10, credit cards are used to a significantly higher extent (59.6%) than at traditional retail outlets, where they are primarily used for larger-value amounts. In general, the use of credit cards is relatively high across payment amounts, which possibly results from the generally high acceptance of credit cards in online shops. Bank transfers are particularly important for higher payment amounts, with their share rising to more than 60% in the cate-

Chart 4

Breakdown of Online Payment Transactions in Austria by Payment Method

% of total number and total value of online payment transactions

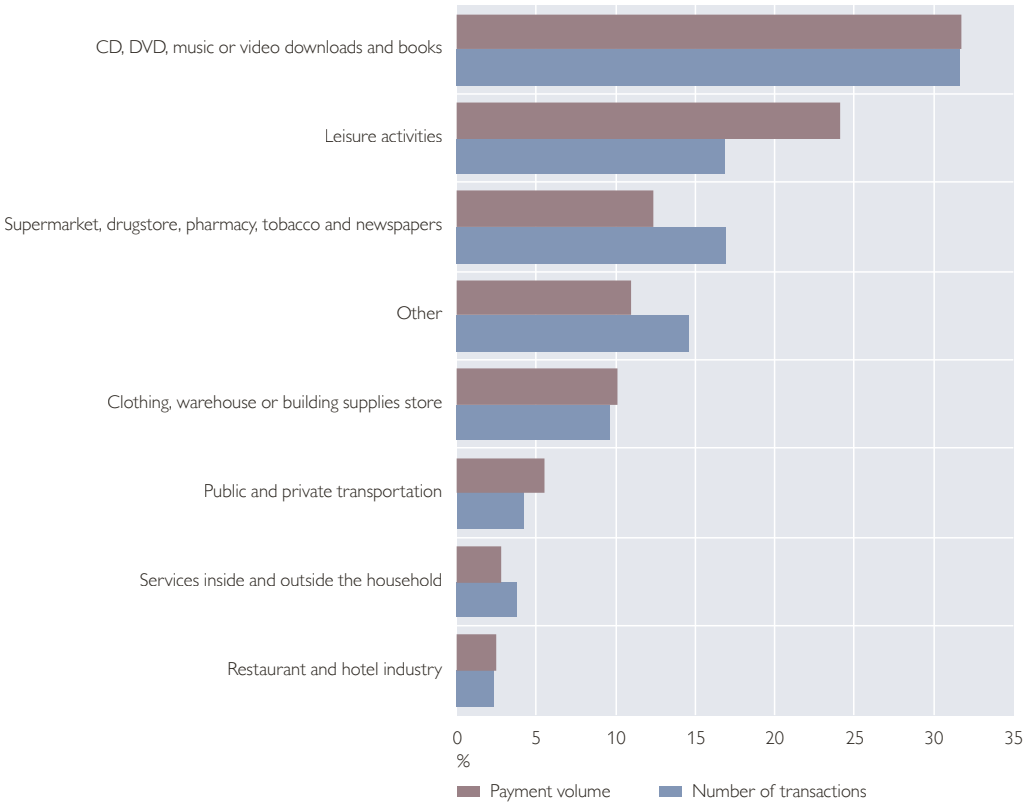


Source: OeNB (Payment Diary).

Note: The chart shows data for 2011.

Chart 5

Breakdown of Online Payment Transactions by Sector



Source: OeNB (Payment Diary).

Note: The chart shows data for 2011.

gory of payments over EUR 100. This might be explained by the fact that in general, more trust is placed in the security of this payment method.

The respondents who filled in the payment diary stated that the majority of their online shopping transactions (32%) belonged to the category of "CD, DVD, music or video downloads and books." Transactions in this category also accounted for 32% of the overall online transaction value. The high popularity of this particular category can possibly be traced to the character of the goods provided and to the fact that the respective online shops are long established and provide a broad range of goods. The business areas "leisure activities" and "supermarket, drugstore, pharmacy, tobacco and newspapers" each accounted for 17% of all online shopping transactions. In terms of the value of payments made, the category "leisure activities" scores considerably higher than the other category, which was to be expected given the strong differences in the value of goods in both categories.

2.4 Comparison with a Deutsche Bundesbank Study Points to Differences

Comparing the above results with those of a survey conducted by the Deutsche Bundesbank in 2012 on the payment behavior of German households, we find similarities in some areas. According to Deutsche Bundesbank (2012), 64% of all respondents were Internet users and

around 77% of Internet users stated they had bought goods or services over the Internet at least once. This is similar to the results of the OeNB study which found that 60% of respondents had used the Internet for online purchases.

When it comes to the individual payment methods used for online purchases, differences in the results can be identified. In Germany, the payment instruments most frequently used for online shopping are credit transfers after delivery (48%)[8] and Internet-specific payment schemes (31%). In particular, male users and users aged 25 to 34 prefer to pay online using Internet-specific payment schemes. 21% of respondents said they used their credit cards – a rate which is far lower than in Austria. In Germany, paying cash on delivery is not as popular as in Austria: According to the Bundesbank's questionnaire, approximately 12% of respondents used this payment method for their online purchases.

The results outlined above and those from previous studies implicate that compared to the Deutsche Bundesbank study the adoption of innovative Internet payment methods in Austria is rather slow. This factor seems to be specific to Austria. The results of the OeNB study showed that Austrians prefer to use traditional payment instruments for online purchases. 67% of respondents stated that they preferred to pay with familiar payment methods. 30% proved open-minded toward new payment instruments once these had become successfully established on the market, and just 3% indicated that they would try new payment methods as soon as they became available.

2.5 Representative Online Shoppers are Young and Well-Educated

When analyzing specific characteristics of online shoppers, an evaluation of Internet usage rates by sociodemographic criteria should be the starting point. The four criteria age, education, gender and community size seem to play a crucial role in this regard. As illustrated in table 3, Internet usage rates are higher for younger age groups and better-educated people. In the youngest age group (15 to 24 years) surveyed, more than 95% said they used the Internet, while the oldest age group (over 60 years) recorded an Internet usage rate of 28%. Almost 94% of people with a university degree said they browsed the Internet, which is significantly higher than the share of Internet users among people with lower education. Furthermore, women were found to use the Internet less frequently than men, and Internet usage is much more widespread in larger communities.

Also, the rate of Internet users who shop online varies greatly across sociodemographic groups (table 3, right-hand column).[9] Again, the most important determining factors here seem to be age, education and gender. Online shopping rates are higher for younger and better educated persons and for men. The older the Internet users are, the less likely they are to make online purchases – around 28% of Internet users aged 60 and older stated that they had ordered goods or services over the Internet in the three months preceding the OeNB payment survey. In contrast, the highest share of online shoppers is observed in the age group of 25 to 44 years (53%), followed by the group

[8] *The OeNB survey does not differentiate between credit (bank) transfer after delivery and prior to delivery.*

[9] *Please note that these numbers only represent people who purchased goods or services over the Internet in the last three months preceding the OeNB payment survey and therefore do not represent the overall share of online shoppers in Austria.*

Table 3

Internet Usage and Online Shopping Behavior by Sociodemographic Characteristics

	Do you use the Internet?	Have you ordered goods or services over the Internet in the past three months?
	% of respondents that answered "yes"	*% of Internet users that answered "yes"*
Age		
15 to 24 years	95.17	45.29
25 to 44 years	89.62	52.52
45 to 59 years	69.28	36.91
over 60 years	28.34	26.89
Education		
Compulsory education	57.36	37.80
Secondary education	78.31	41.42
Higher secondary education	89.46	51.00
University education	94.09	64.58
Gender		
Women	63.82	39.89
Men	73.89	48.53
Community size		
Up to 2,000 residents	59.96	46.82
Up to 5,000 residents	65.10	52.41
Up to 20,000 residents	66.97	45.72
Up to 1 Mio residents	69.90	40.19
Over 1 million residents	80.62	38.21

Source: OeNB Payment Survey, 2011.

Note: This table summarizes the results of two questions asked in the questionnaire.

aged 25 years and younger (45%). Although this age group has the highest rate of Internet usage, it only accounts for the second highest share of online shoppers. An explanation for this finding could be that younger people usually have low income or none at all. The level of education also seems to play a key role: the higher the education level, the higher the share of Internet users who shop online. In addition, the share of Internet users who claimed to have ordered goods or services over the Internet ranges from 38% (compulsory education) to 65% (university degree), which is the greatest difference among all sociodemographic groups. Male Internet users shop online more frequently than women. At least for the two criteria education and gender, the OeNB payment survey demonstrates that the higher the share of Internet users is, the higher the rate of online shoppers is. In contrast to this, the rate of online shoppers is found to be lowest in the most densely populated areas, which have the highest share of Internet users. In communities with over 1 million residents, only 38% of Internet users claim to have bought goods or services over the Internet – in smaller communities (up to 5,000 residents), the comparable figure is 52%. A possible explanation for this result might be a lack of shopping facilities in smaller communities, which makes online shopping more attractive in these areas.

Statistical tests confirm that each of the four criteria has a statistically significant influence on Internet usage and online shopping rates. In this regard, we performed multiple logit regressions in combination with likelihood ratio tests. Each regression considered Internet usage, or online shopping, as a dichotomous dependent variable and only one of the sociodemographic criteria as a categorical independent variable to steer clear from possible interactions between sociodemographic criteria.[10]

3 ECB Focus on Security

Although the questionnaire did not include questions on the perceived security, it is worth taking a look at the currently increasing institutional awareness and the ongoing issues in this area. In the EU as well as in Austria, Internet security plays a major role when it

[10] *For every statistical test used in this study, the significance level was set to 0.05. In case of multiple tests on the same set of data, the Bonferroni correction was utilized to regulate the alpha adjustment for multiple comparisons.*

comes to online shopping. When talking about Internet security, the terms payment card fraud, phishing and malware are often used together. These are forms of identity theft and involve the unauthorized use of confidential and personal information with the aim of charging purchases to a third party's account or removing funds from such an account. The total level of fraud using cards issued within the Single Euro Payments Area (SEPA) amounted to EUR 1.16 billion in 2011 (ECB, 2013). 56% (EUR 655 million) of this total resulted from card-not-present payments, including card-not-present payments carried out via the Internet.[11] Card-not-present fraud is therefore the largest category by far and has been the main driver of fraud rates in previous years. Phishing refers to the practice of sending e-mails with a link to a fake website and requesting confidential information such as customer or transaction credentials. Malware (short for malicious software) includes computer viruses that can be installed on a device in order to undertake unauthorized actions on the user's computer with the aim of capturing sensitive data. Since these risks are of great concern for consumers when shopping online, it is crucial for payment service providers to implement high security standards to gain consumer trust. In their capacity as the overseers and supervisors of such providers, central banks and supervisory authorities are called upon to play a key role in this regard. Against this background, the European Forum on the Security of Retail Payments (SecuRe Pay) was established in 2011. It is a voluntary cooperative initiative of supervisors of payment service providers and payment systems overseers whose aim is to generate a common understanding of issues regarding the security of electronic retail payment services and instruments (ECB, 2013a). The first achievement of this initiative was to draft a set of "Recommendations for the security of Internet payments," published by the ECB in January 2013. These 14 recommendations define the very minimum of security measures that should be implemented by payment service providers[12] who offer Internet payment services and by governance authorities of payment schemes (e.g. card payment, credit transfer and direct debit schemes). To take account of technological innovation, the recommendations are formulated in a more generic way. They are built upon four guiding principles (ECB, 2013a):

- *Principle 1:* Risk assessments regarding the provision of Internet payment services should be conducted on a regular basis. Given the rapid advancement of the Internet, regular updates of the risk assessments are necessary to tackle new types of Internet fraud.
- *Principle 2:* The execution of Internet payments and access to sensitive data should be protected by strong customer authentication. This is a procedure that uses two or more of the following elements during the payment process: (1) something only the user knows (e.g. a password or personal identification number); (2) something only the user possesses (e.g a token, smart card or mobile phone) or (3) something the user is (e.g. biometric characteristics).
- *Principle 3:* Payment service providers should implement strong measures

[11] *About 25% of the total value of fraud in 2011 resulted from payments at point-of-sale (POS) terminals and almost 20% at automated teller machines (ATMs).*

[12] *As defined in the Payment Services Directive.*

for authorizing transactions as well as means to monitor unusual customer payment behavior in order to prevent fraud.

- *Principle 4:* Finally, payment service providers and governance authorities should engage in promoting customer awareness. This includes developing education programs on security issues with the aim of ensuring that customers use Internet payment services safely and efficiently.

The recommendations of the ECB are to be integrated in the respective national jurisdictions and supervisory and/or oversight frameworks, and market players will have to comply with them by February 1, 2015, at the latest.

4 Summary and Conclusion

Technological advances and a general rise in Internet access points have resulted in a steady increase in Internet use. In line with these developments, the Internet has become a promising medium for innovative services and applications like online shopping, which results in the evolution of new payment methods. Since this aspect is of utmost importance for central banks, this study focuses on the payment behavior of Austrian households shopping on the Internet. The study is based on a survey commissioned by the OeNB in fall 2011. The survey included a detailed questionnaire as well as a "payment diary," in which respondents were asked to record the payments they had made for goods and services in the week preceding the survey. While the survey investigates the general payment habits of Austrian households, this analysis focuses only on the use of the Internet and on online shopping habits. As the number of cases surveyed was relatively small, the results should be interpreted with caution (in particular with regard to payment diary data).

The survey revealed that almost 70% of respondents use the Internet and over 60% have used online shopping facilities at least once in their lifetime. Looking at the payment diary data, about 7.3% of respondents said they had done some online shopping during the week preceding the survey, conducting a total of 125 transactions and accumulating a transaction volume of EUR 9,342. With a share of over 49% in total online payments, bank transfers were the most frequently used payment method, followed by credit card payments with a share of 27%. Although Internet-specific payment methods like PayPal or "eps Online-Überweisung" were used to a far lesser extent, the use of these payment methods increased considerably compared to the findings of the last OeNB payment study in 2006. With regard to payment volumes, the data show a similar picture, with bank transfers and credit card payments accounting for the highest shares in online payment volumes. The most popular sectors in which respondents bought goods or services over the Internet were "leisure activities" and "CD, DVD, music or video downloads and books."

As observed in previous studies, Internet usage and online shopping habits vary greatly across sociodemographic groups. Age, gender, education and community size seem to have a significant impact on people's Internet use and online shopping behavior. The share of Internet use is higher for men, younger and more highly educated people and in more densely populated areas. In the case of online shopping, the same is true for the criteria age, gender and education. In contrast to the results for Internet use, the share of online shoppers is highest in smaller communities, which might be due to a lack of shopping facilities in these areas.

Consumers' concerns about user safety play a major role in their choice to purchase goods or services online. Internet payment service providers should therefore guarantee a high level of security. As overseers and supervisors of such providers, central banks and supervisory authorities have a key role to play in this regard. Against this background, the European Forum for the Security of Retail Payments was established. This forum is a voluntary cooperative initiative of supervisors of payment service providers and payment systems overseers with the aim of generating a common understanding of issues regarding the security of electronic retail payment services and instruments. The first achievement of this forum was to draft a set of "Recommendations for the security of Internet payments," published by the ECB in January 2013. These standards are to be considered as common minimum requirements for Internet payment services and have to be implemented by payment service providers and governance authorities of payment schemes by February 1, 2015 at the latest.

In conclusion, strong growth in e-commerce in recent years has promoted the use of payment instruments on the Internet, allowing consumers to purchase digital or physical goods simply and quickly. Therefore, online shopping is likely to have a growing influence on overall payment behavior (Deutsche Bundesbank, 2012). Although traditional payment instruments are currently very popular for online payments, new methods are being developed. Central banks will continue to play an important role in online payments, as they are responsible for payment systems oversight and policymaking in this field.

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Notes

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

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Annual Report (Sustainability Report) — English | annually

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www.oenb.at/de/presse_pub/period_pub/unternehmen/geschaeftsbericht/geschaeftsberichte.jsp
www.oenb.at/en/presse_pub/period_pub/unternehmen/geschaeftsbericht/geschaeftsbericht.jsp

Konjunktur aktuell — German | seven times a year

This online publication provides a concise assessment of current cyclical and financial developments in the global economy, the euro area, Central, Eastern and Southeastern European countries, and in Austria. The quarterly releases (March, June, September and December) also include short analyses of economic and monetary policy issues.

www.oenb.at/de/geldp_volksw/konjunktur/konjunktur_aktuell.jsp

Monetary Policy & the Economy — English | quarterly

This publication assesses cyclical developments in Austria and presents the OeNB's regular macroeconomic forecasts for the Austrian economy. It contains economic analyses and studies with a particular relevance for central banking and summarizes findings from macroeconomic workshops and conferences organized by the OeNB.

www.oenb.at/en/presse_pub/period_pub/volkswirtschaft/geldpolitik/monetary_policy_and_the_economy.jsp

Fakten zu Österreich und seinen Banken — German | twice a year
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www.oenb.at/de/presse_pub/period_pub/statistik/fakten/fakten_zu_oesterreich_und_seinen_banken.jsp
www.oenb.at/en/presse_pub/period_pub/statistik/fakten/facts_on_austria_and_its_banks.jsp

Financial Stability Report — English | twice a year

The Reports section of this publication analyzes and assesses the stability of the Austrian financial system as well as developments that are relevant for financial stability in Austria and at the international level. The Special Topics section provides analyses and studies on specific financial stability-related issues.

www.oenb.at/en/presse_pub/period_pub/finanzmarkt/finanzmarktstabilita/financial_stability_report.jsp

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www.oenb.at/en/presse_pub/period_pub/volkswirtschaft/integration/focus_on_european_economic_integration.jsp

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www.oenb.at/de/presse_pub/period_pub/statistik/statistiken/statistiken_-_daten_und_analysen.jsp

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www.oenb.at/en/presse_pub/period_pub/volkswirtschaft/vowitagung/economics_conferences.jsp

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English | annually

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http://www.oenb.at/en/geldp_volksw/zentral_osteuropa/Events/archive_programs_ceei.jsp
The proceedings have been published with Edward Elgar Publishers, Cheltenham/UK, Northampton/MA, since the 2001 conference.
www.e-elgar.com

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