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EUROSYSTEM

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Call for applications: Visiting Research Program

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

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

Applications (in English) should include

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

Applications for 2018 should be e-mailed to *eva.gehringer-wasserbauer@oenb.at* by November 1, 2017.

Applicants will be notified of the jury's decision by mid-December. The following round of applications will close on May 1, 2018.

Analyses

2017 marked by accelerated economic growth and declining unemployment

Economic outlook for Austria from 2017 to 2019 (June 2017)

Christian Ragacs,
Klaus Vondra[1]

1 Executive Summary

Austria's economy is recovering, with both domestic and foreign demand driving the rebound. Having accelerated by 1.4% in 2016, real GDP is projected to grow by 2.2% in 2017, 1.7% in 2018 and 1.6% in 2019. These figures represent upward revisions of 0.7 and 0.2 and 0.1 percentage points, respectively, versus the OeNB's December 2016 outlook. The unemployment rate is forecast to decline to 5.4% by 2019 from the historic peak of 6.0% seen in 2016. The inflation rate is expected to rise to 2.0% in 2017 and to reach 1.8% in both 2018 and 2019.

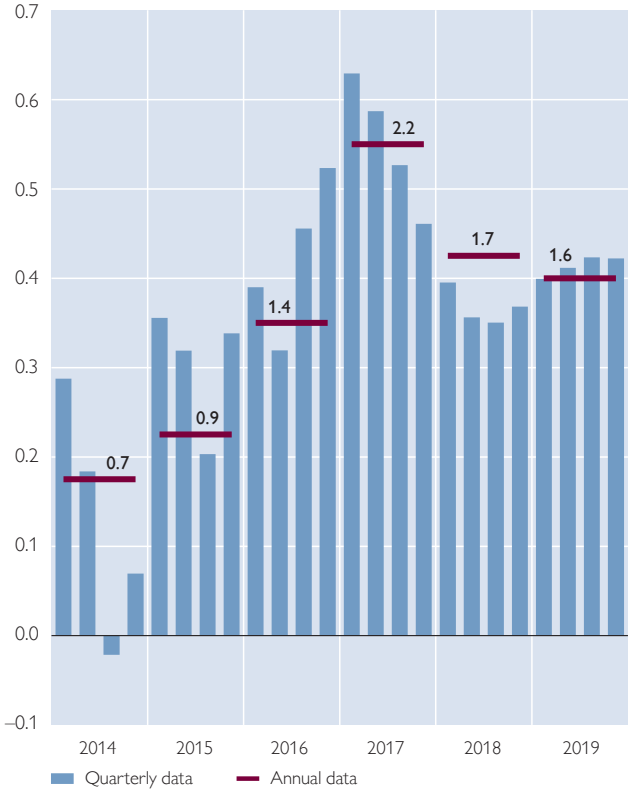
The global economy, and especially world trade, gained strong momentum in late 2016 and early 2017. Nine years after the global financial and economic crisis hit, which was followed by a sovereign debt crisis in several euro area countries and by economic recessions in a range of commodity-exporting econo-

Chart 1

Main results of the forecast

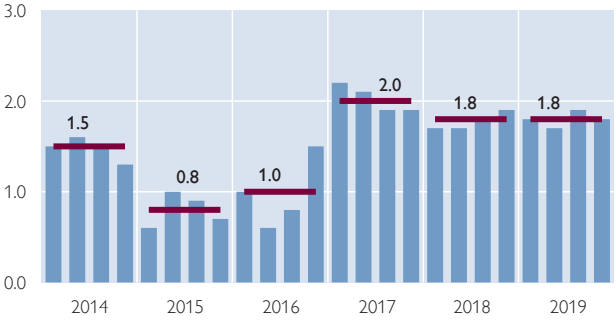
Real GDP growth

Change on previous period in % (seasonally and working day-adjusted)



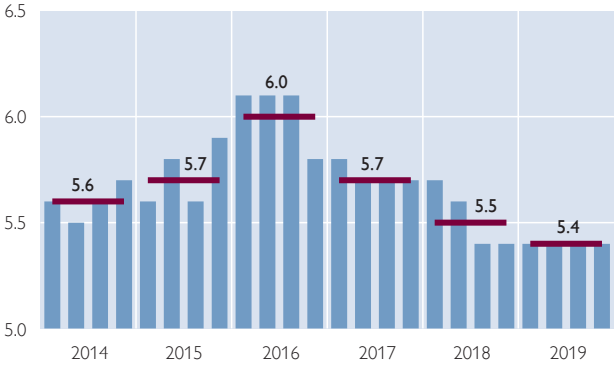
Harmonised Index of Consumer Prices

Annual change in %



Unemployment rate

% of labor supply



Source: WIFO, Statistics Austria, OeNB June 2017 outlook.

Cutoff date:
May 23, 2017

[1] *Oesterreichische Nationalbank, Economic Analysis Division, christian.ragacs@oenb.at, klaus.vondra@oenb.at. With contributions from Paul Eckerstorfer, Friedrich Fritzer, Ernest Gnan, Walpurga Köhler-Töglhofer, Lukas Reiss, Doris Ritzberger-Grünwald and Alfred Stiglbauer.*

mies, conditions were gradually normalizing in 2016, both in advanced and emerging economies. Lingering uncertainty about the economic repercussions of the United Kingdom's vote to leave the EU or the future course of U.S. economic policy following the unexpected presidential election outcome remained without negative effects on the economy in the short run. The United States will also be among the key drivers of global growth in the years ahead, as will be the euro area. Austria's export industries stand to benefit from these developments – as well as from the good growth performance of the CESEE economies. In 2017, domestic exports are projected to grow by 4.2% (2016: 1.8%).

The key driver of domestic growth in 2017, in addition to net exports, is the ongoing strength of domestic demand. Private consumption continues to benefit from the income tax reform that took effect in January 2016 and from the high level of employment growth. While these two factors continue to boost real disposable income growth in 2017, higher inflation has a dampening effect. Real consumption is projected to grow by 1.6% in 2017, accompanied by a slight decline of the saving ratio, to be followed by still fairly robust real consumption growth rates of 1.2% in both 2018 and 2019. Hence, private consumption remains a major pillar of growth throughout the forecast horizon. The investment cycle will peak in 2017. The cycle is driven above all by investment in plant and equipment, with extension investment gradually becoming more relevant than replacement investment. The investment ratio[2] is expected to inch up to 23.2% in 2017 (2016: 22.9%) and to level off thereafter.

The economic recovery fed through to the labor market already in 2016. Businesses were hiring not only in the services sector – like in previous years – but also in the industrial sector, and there was also a significant increase in the number of hours worked. With employment growth having continued in the early months of this year, employment is expected to grow further during 2017, both in terms of jobs and hours worked. As the recovery subsides in 2018 and 2019, the pace of employment growth is projected to decline somewhat, while continuing to be robust by historical standards. Given the high level of labor demand on account of the economic recovery as well as one-off labor market measures, the unemployment rate will go down again despite the continued strong labor supply growth rate. Following 6.0% seen in 2016, the unemployment rate is estimated to stand at 5.7% in 2017, 5.5% in 2018 and 5.4% in 2019.

Inflation as measured by the Harmonised Index of Consumer Inflation (HICP) is projected to rise to 2.0% in 2017 – driven above all by commodity price changes – compared with 1.0% in 2016. The projections for 2018 indicate a slight decline, to 1.8%. Despite the considerable economic recovery, the domestic drivers of inflation will generate only moderate inflation pressures.

The general government budget balance is projected to improve in 2017, to –0.9% of GDP, following a temporary deterioration in 2016 (–1.6% of GDP). This improvement essentially reflects the enhanced economic conditions and ongoing refinancing at low interest rates. However, the reduction of the deficit is being slowed down by the cuts in employer contributions to the family burden equalization fund,

[2] *Nominal gross fixed capital formation as a percentage of nominal GDP.*

effective from January 1, 2017, and the lagged tax relief effect. The budget balance is expected to continue to improve in 2018 and 2019 given the favorable framework conditions. At the same time, a number of measures listed in the government's work program for 2017 will drive up the deficit. These measures include bonus payments for employers creating additional jobs, the creation of 20,000 subsidized jobs for long-term unemployed people over 50 and additional investment subsidies.

Having peaked at 85.5% of GDP in 2015, the general government debt ratio declined in 2016, for the first time since the global economic crisis hit. The debt ratio is expected to decrease further and drop below 80% of GDP by 2019. The decline reflects a marked increase in the level of nominal GDP as well as the progressive divestment of impaired assets by the government-run bad banks.

Following a significant decline of the structural budget balance in 2016, to –1.0% of GDP, reflecting the tax reform among other things, 2017 is expected to see improvements. Thanks to the continued strong decline in interest payments, the Austrian budget deficit stands to become realigned with the domestic medium-term objective for Austria's budgetary position to be in balance or surplus (structural balance of –0.45% of GDP) in 2019.

2 Technical assumptions

This forecast for the Austrian economy is the OeNB's contribution to the June 2017 Eurosystem staff macroeconomic projections. The forecast horizon ranges from the first quarter of 2017 to the fourth quarter of 2019. The cutoff date for all assumptions on the performance of the global economy as well as on interest rates, exchange rates and crude oil prices was May 17, 2017. To prepare these projections, the OeNB used its macroeconomic quarterly model and national accounts data, adjusted for seasonal and working-day effects (trend-cycle component), provided by the Austrian Institute of Economic Research (WIFO). These data differ from the quarterly series published by Eurostat since the changeover to the European System of Accounts (ESA) 2010 in fall 2014 in that the latter, while being seasonally and working-day adjusted like the data used by the OeNB, also include irregular fluctuations that cannot be fully mapped to specific economic fundamentals. The historical annual data deviate also from the seasonally unadjusted data released by Statistics Austria. National accounts data were fully available up to the fourth quarter of 2016. The data for the first quarter of 2017 are based on the GDP flash estimate, which does not cover all national accounts aggregates, however. The short-term interest rate used for the forecast horizon is based on market expectations for the three-month EURIBOR: namely –0.3% for 2017, –0.2% for 2018 and 0.0% for 2019. Long-term interest rates, which reflect market expectations for ten-year government bonds, have been set to rise from 0.7% in 2017 to 1.2% by 2019. The exchange rate of the euro vis-à-vis the U.S. dollar is assumed to remain at a constant USD/EUR 1.09. The projected path of crude oil prices is based on futures prices, which imply very little changes in oil prices per barrel Brent from 2017 (USD 51.6) to 2019 (USD 51.5). The prices of commodities excluding energy are also based on futures prices over the forecast horizon.

Table 1

OeNB June 2017 outlook for Austria – main results[1]

	2016	2017	2018	2019
Economic activity	*Annual change in % (real)*			
Gross domestic product (GDP)	+1.4	+2.2	+1.7	+1.6
Private consumption	+1.4	+1.6	+1.2	+1.2
Government consumption	+1.9	+0.9	+1.8	+0.8
Gross fixed capital formation	+3.1	+3.3	+2.0	+1.7
Exports of goods and services	+1.8	+4.2	+4.0	+3.9
Imports of goods and services	+3.5	+3.7	+3.8	+3.4
	% of nominal GDP			
Current account balance	1.7	2.1	2.4	2.8
Contribution to real GDP growth	*Percentage points*			
Private consumption	+0.7	+0.8	+0.6	+0.6
Government consumption	+0.4	+0.2	+0.4	+0.2
Gross fixed capital formation	+0.7	+0.8	+0.5	+0.4
Domestic demand (excluding changes in inventories)	+1.8	+1.8	+1.4	+1.2
Net exports	–0.8	+0.4	+0.3	+0.4
Changes in inventories (including statistical discrepancy)	+0.4	+0.0	+0.0	+0.0
Prices	*Annual change in %*			
Harmonised Index of Consumer Prices (HICP)	+1.0	+2.0	+1.8	+1.8
Private consumption expenditure (PCE) deflator	+1.3	+1.9	+1.7	+1.7
GDP deflator	+1.4	+1.6	+1.9	+1.8
Unit labor costs (whole economy)	+1.2	+0.4	+1.8	+1.4
Compensation per employee (at current prices)	+1.3	+1.3	+2.2	+1.9
Compensation per hour worked (at current prices)	+1.8	+1.5	+2.5	+2.3
Import prices	–1.2	+2.6	+1.9	+1.8
Export prices	–0.5	+2.7	+2.1	+1.9
Terms of trade	+0.7	+0.1	+0.2	+0.2
Income and savings				
Real disposable household income	+2.3	+1.0	+1.4	+1.2
	% of nominal disposable household income			
Saving ratio	8.2	7.9	7.9	7.9
Labor market	*Annual change in %*			
Payroll employment	+1.5	+1.5	+1.5	+1.2
Hours worked (payroll employment)	+1.0	+1.3	+1.1	+0.8
	% of labor supply			
Unemployment rate (Eurostat definition)	6.0	5.7	5.5	5.4
Public finances	*% of nominal GDP*			
Budget balance	–1.6	–0.9	–0.9	–0.5
Government debt	84.6	80.2	78.0	75.8

Source: 2016: WIFO, Eurostat, Statistics Austria; 2017 to 2019: OeNB June 2017 outlook.

[1] The outlook was drawn up on the basis of seasonally and working day-adjusted national accounts data (trend-cycle component: flash estimate for Q1 17). The data differ, in the method of seasonal adjustment, from the quarterly data published by Eurostat following the switch to the ESA 2010 framework in fall 2014 (the data published by Eurostat are much more volatile and do not facilitate detailed economic interpretation). The values for 2016 deviate also from the data released by Statistics Austria, which have not been seasonally adjusted.

3 World economy and world trade buoyed by tailwinds in early 2017

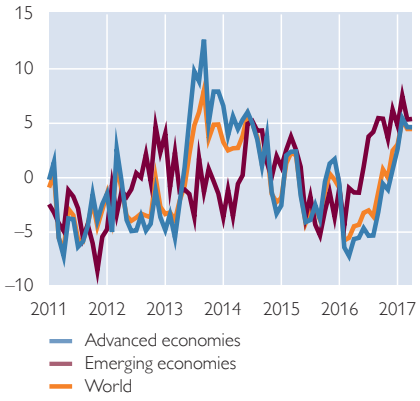
The *global economy*, and especially world trade, gained strong momentum in late 2016 and early 2017. Nine years after the global financial and economic crisis hit, which was followed by a sovereign debt crisis in several euro area countries and by economic recessions in a

Chart 2

Upward trend in world GDP and world trade in early 2017

Purchasing Managers' Index

Annual change in %

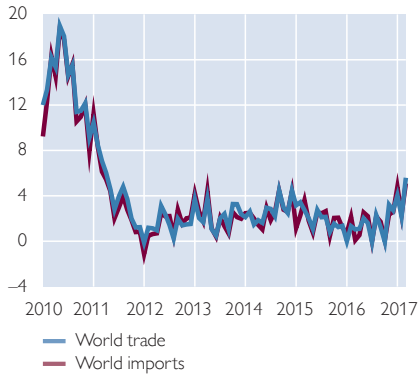


Source: Markit.

Note: Composite PMI = manufacturing and services.

Volume of world trade

Annual change in %

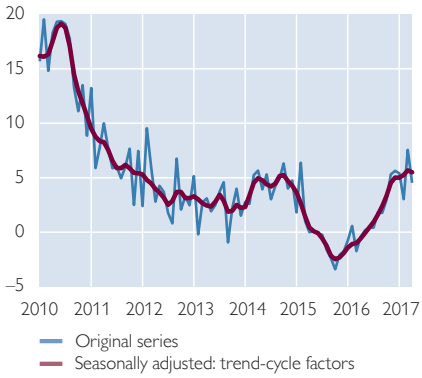


Source: CPB Netherlands Bureau for Economic Policy Analysis.

Note: Seasonally adjusted data.

Container Throughput Index

Annual change in %



Source: RWI – Leibniz Institute for Economic Research.

range of commodity-exporting economies, suffering, above all, under the setback of commodity prices, conditions were gradually normalizing in 2016, both in advanced and emerging economies. Following an agreement on cutting crude oil production,[3] oil prices rose to a level of around EUR 50 per barrel of Brent oil in late 2016. Rising oil prices drove up inflation, thus easing the risk of deflation in advanced economies.

The United Kingdom's vote to leave the EU and the unexpected outcome of the U.S. presidential elections remained without adverse short-term effects on the economy; both U.S. growth and U.K. growth exceeded the expectations serving as the basis for the OeNB's December 2016 outlook. This notwithstanding, the implementation of the Brexit vote as well as a potential reversal of U.S. economic policy do constitute a risk for the future development of the world economy. So far, the continued tensions in the Middle and Far East as well as the political upheaval in Turkey have not affected global sentiment and world economic growth but continue to pose a risk to the global economy.

Central bank policies have been mirroring the robust economic performance. The United States abandoned its quantitative easing policies already in 2014. Since 2015, the U.S. Fed has increased its policy rates in three steps, to a level of between 0.75% and 1%, and further interest rate hikes have been signaled for 2017. The Bank of Japan, in contrast, has so far not seen any need for changing its monetary policy stance. The same holds true for the Eurosystem at present. At its meeting of April 27, 2017, the Governing Council of the ECB continued to expect the key policy rates to remain at present or lower levels for an extended period of time, and well past the horizon of the net asset purchases.

Rising oil prices benefited the budgets of *commodity-exporting economies* in 2016. The recovery observed in advanced economies fueled demand for commodities,

[3] *At its Algiers meeting in September 2016, OPEC committed itself to reducing output to between 32.5 to 33 million barrels per day. This ratio required OPEC members to cut production by some 1.3 million barrels per day but also hinged on a self-commitment of Russia not to increase its own production.*

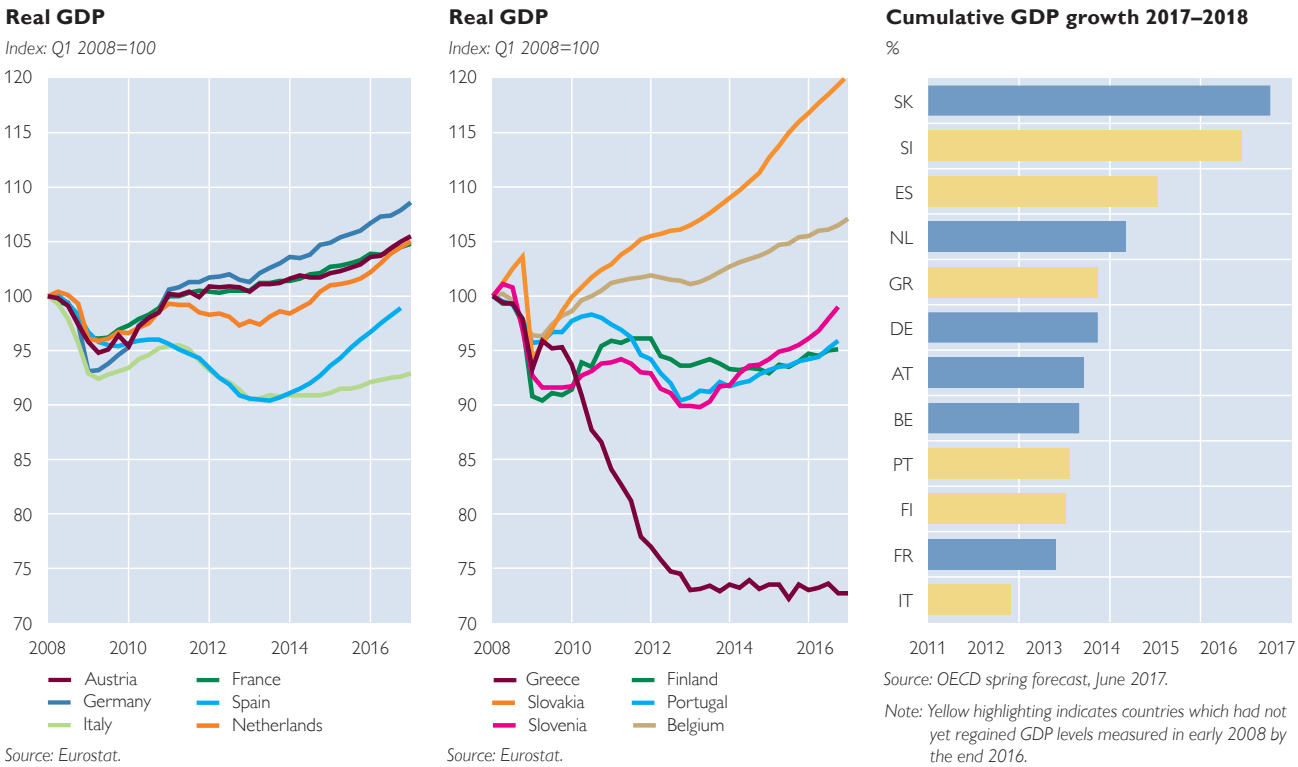
above all oil. Both of these factors have helped commodity-exporting countries – including Russia and Brazil – to emerge from recession. The rebalancing of China's economic policy to ensure the long-term sustainability of growth (which entails shifting from investment to consumption on the demand side) has not been a burden on commodity-exporting economies and the global economy at large.

The advanced economies returned to accelerating growth in mid-2016 and have since returned to a sustainable growth path. Moreover, the global economic recovery has been accompanied by a recovery of global trade. Most recently annual global trade growth accelerated to exceed 5% – for the first time since 2011. Leading indicators for world trade, such as the RFI/ISL Container Throughput Index, are also indicative of increased momentum in world trade.

The United States will be among the key drivers of global growth in the years ahead, as will be the euro area. At quarterly (quarter-on-quarter) growth rates of 0.5% in late 2016 and early 2017, economic activity in the euro area has surpassed potential output growth. Consequently, the negative output gap has been shrinking steadily. Robust GDP growth has benefited from the nonstandard monetary policy measures, which had caused the interest rate differential between the peripheral and core euro area countries to contract to below 50 basis points by end-2016. Lending to nonfinancial corporations returned into positive territory already in early 2016, and growth of housing loans likewise accelerated throughout 2016. In the euro area, domestic demand continues to be the main driver of the economy. On the back of strong employment growth and real wages pushed up by low inflation,

Chart 3

Positive GDP growth but ongoing regional divergence in the euro area



Source: Eurostat.

Source: Eurostat.

Source: OECD spring forecast, June 2017.

Note: Yellow highlighting indicates countries which had not yet regained GDP levels measured in early 2008 by the end 2016.

private consumption considerably boosted growth already in 2016. In contrast, gross fixed capital formation has contributed only little to growth even though financing conditions have remained excellent in the euro area. The acceleration of global economic growth, and world trade in particular, has, however, resulted in a positive contribution from net exports. Labor market conditions have seen a steady improvement, with employment continuously increasing since mid-2015. At about 9.5%, the unemployment rate has declined by more than 2.5 percentage points from its mid-2013 record high. This reduction has been driven particularly by developments in Ireland, Spain and Portugal.

However, the positive growth climate in the euro area as a whole masks the persistent strong heterogeneity of GDP growth across the individual member countries, as evidenced in chart 3 with data from 2008 onward for the twelve largest euro area economies which together account for over 96% of the euro area's output.[4] Six of these countries – namely Greece, Italy, Finland, Portugal, Slovenia and Spain,– were still short of their respective pre-crisis GDP levels at the end of 2016. After four years of weak economic growth of below 1% per year, Austria's GDP growth is almost on a par with that of France and the Netherlands and not quite as strong as that of Belgium and Germany. Slovakia recorded a marked increase in economic output until early 2017.

All euro area countries are forecast to post positive annual growth rates in

Table 2

Underlying global economic conditions

	2016	2017	2018	2019
	Annual change in % (real)			
Gross domestic product				
World excluding the euro area	+3.2	+3.5	+3.8	+3.8
U.S.A.	+1.6	+2.2	+2.5	+2.3
Japan	+1.0	+1.3	+0.7	+0.6
Asia excluding Japan	+6.1	+6.0	+6.0	+5.9
Latin America	–1.3	+0.9	+2.4	+2.7
United Kingdom	+1.8	+1.8	+1.5	+1.6
CESEE EU Member States[1]	+3.1	+3.7	+3.1	+3.1
Switzerland	+1.3	+1.6	+1.8	+1.9
Euro area[2]	1.7	1.9	1.8	1.7
World trade (imports of goods and services)				
World	–1.8	+3.4	+2.3	+2.7
World excluding the euro area	–3.9	+2.3	+2.9	+3.4
Growth of euro area export markets (real)	–1.9	+3.4	+3.0	+3.1
Growth of Austrian export markets (real)	+2.9	+4.4	+4.2	+4.1
Prices				
Oil price in USD/barrel (Brent)	44.0	51.6	51.4	51.5
Three-month interest rate in %	–0.3	–0.3	–0.2	0.0
Long-term interest rate in %	0.4	0.7	0.9	1.2
USD/EUR exchange rate	1.11	1.08	1.09	1.09
Nominal effective exchange rate of the euro (euro area index)	110.4	109.9	110.3	110.3

Source: Eurosystem.

[1] *Bulgaria, Croatia, Czech Republic, Hungary, Poland and Romania.*
[2] *2016: Eurostat; 2017 to 2019: Results of the Eurosystem's June 2017 projections.*

[4] *Instead of Ireland, which is currently struggling with calculating its national accounts, this list includes Slovenia.*

2017 and 2018.[5] While economic growth will be buoyant in this period in Slovakia and Ireland, the recovery will be subdued in Italy and France. Greece managed to stabilize its economy in recent years, but continues to lag behind its euro area peers with regard to the pace of economic recovery. The new austerity measures currently under discussion are set to dampen the recovery again, but the current growth outlook for Greece nevertheless remains robust. Spain managed to return to relatively solid GDP growth rates in recent years, and is expected to repeat its strong economic performance also this and next year. The German economy, finally, exhibited strong growth rates over the past three years but is expected to be slightly less dynamic in the years ahead.

4 Austrian economy back on solid growth path

4.1 Europe's economic recovery underpins growth of Austrian exports

Bogged down by weak international demand, real growth of Austrian goods and services exports came to less than 2% and that of nominal goods exports alone (national accounts data) to 0.5% in 2016. Nominal goods exports to non-EU countries even shrank somewhat, largely on the back of decreasing exports to the U.S.A. and to Asia (especially to the Middle East). The real expansion of services exports, by contrast, contracted only minimally over the previous years amid highly dynamic tourism exports. Travel revenues increased by 6.2% in 2016, with the income surplus running to EUR 8.8 billion. With countries and regions like Turkey and North Africa faced with political uncertainty, even more tourists have flocked to Austria in recent years. As a result, Austria's tourist industry increased its market share. In contrast to travel receipts, the contribution of business services to net exports went down also in 2016. The balance of business services exports and imports came to a mere EUR 1.4 billion (compared with a record high of EUR 5.2 billion in 2007). This decline is above all attributable to increased imports of (mainly transportation) services from CESEE countries. Exports of business services have traditionally been closely aligned with exports of goods. Given that goods exports are on the rise, exports of business services are expected to rebound in due course.

In contrast to exports, imports jumped by 3.5% in real terms in 2016, which was due to rising domestic demand for consumer and capital goods. Private consumption, which grew by 1.4% in 2016, accounts for 31%[6] of imports – in other words, about one-third of households' demand is met by imports. Changes in company car taxation[7] likewise boosted imports in 2016. Car imports (SITC 781) surged by 16% in 2016, thus accounting for some two-thirds of total goods imports growth last year and 5.1% of total Austrian goods imports (Comext data[8]). In light of the weak export and comparatively strong import growth, net exports made a negative contribution

[5] *In light of the cutoff date, this outlook reflects the OECD economic outlook released in June 2017 instead of the June 2017 Eurosystem staff macroeconomic projections.*

[6] *Source: World Input-Output Table for 2014.*

[7] *Following the tax reform, the monthly taxable value for the private use of company cars was raised from 1.5% of acquisition costs (hitherto irrespective of the CO2 emission limit set by the EU) to 2% of the acquisition costs for cars whose emission levels exceed the target of 130 grams of CO2 per kilometer.*

[8] *Comext data are used to calculate national accounts data despite methodological differences. In 2016, goods imports grew by 1.8% according to national accounts data and by 1.2% according to Comext data (in nominal terms, year on year).*

to GDP growth in 2016 (–0.8 percentage points).

As import demand had increased markedly in some of Austrian exporters' major target markets (e.g. Germany, the CESEE countries and countries in Eastern Asia) toward the end of 2016, Austrian exports strengthened significantly in early 2017. The annual growth rate of nominal goods exports (as published by Statistics Austria) surged by 18.3% – partly thanks to one-off effects[9] – in January 2017. Real goods and services exports grew at 2.1% (quarter on quarter) in the first three months of 2017.

With world trade rebounding, exports to both euro area and non-euro area countries will increase further. This is why real exports are projected to accelerate sharply, by 4.2%, in 2017 and to keep growing largely in sync with the growth rates expected for export markets in 2018 (4.0%) and 2019 (3.9%). As to Austrian exporters' price competitiveness, no substantial change is on the horizon. This translates into negligible losses of market shares in the forecasting period. Import growth, which is determined by the development of demand components and their import elasticities, will lag behind export growth in this period. The contribution of net exports to growth will therefore turn positive again.

At 1.7% of GDP, Austria's current account balance in 2016 had deteriorated by 0.2 percentage points against the previous year. This was due to a special effect related to company car purchases, which significantly boosted car imports and weighed on the goods balance. The balance of goods contracted from 0.4% of GDP in 2015 to –0.1% of GDP in 2016. The balance on income, by contrast, improved slightly in 2016. In 2017, the goods balance will be back in positive territory. Together with an improved balance on services, this will have a favorable effect on the current account, and this uptrend will continue into 2018 and 2019.

Table 3

Growth and price developments in Austria's foreign trade

	2016	2017	2018	2019
	Annual change in %			
Exports				
Competitor prices on Austria's export markets	–2.9	+3.7	+1.9	+2.0
Export deflator	–0.5	+2.7	+2.1	+1.9
Changes in price competitiveness	–2.4	+1.0	–0.2	+0.1
Import demand on Austria's export markets (real)	+2.9	+4.4	+4.2	+4.1
Austrian exports of goods and services (real)	+1.8	+4.2	+4.0	+3.9
Austrian market share	–1.1	–0.2	–0.2	–0.2
Imports				
International competitor prices on the Austrian market	–2.2	+2.7	+1.7	+1.8
Import deflator	–1.2	+2.6	+1.9	+1.8
Austrian imports of goods and services (real)	+3.5	+3.7	+3.8	+3.4
Terms of Trade	+0.7	+0.1	+0.2	+0.2
	Percentage points of real GDP			
Contribution of net exports to GDP growth	–0.8	+0.4	+0.3	+0.4
	% of nominal GDP			
Export share	52.3	53.9	55.3	56.6
Import share	48.7	49.9	51.0	51.9

Source: 2016: WIFO, Eurosystem; 2017 to 2019: OeNB June 2017 outlook.

[9] *For one thing, January 2017 had two working days more than January 2016, and for another, a major shipment of goods was made to France.*

Box 1

Public finances from 2016 to 2019[1]

In 2016, the general government deficit rose by 0.5 percentage points to 1.6% of GDP. The higher deficit was above all due to revenue-side shortfalls: as a result of the tax reform, wage tax receipts dropped significantly in 2016 and the envisaged funding measures fell short of the targeted volume. Considerable shortfalls were also attributable to the fact that anticipatory effects in the area of capital gains tax on dividends had run their course. These effects were only partly offset by the surge in corporate income tax revenue. On the expenditure side, additional expenses resulted in particular from refugee-related spending. On balance, the government expenditure ratio sank in light of ongoing refinancing at decreasing interest rates and in the absence of capital transfers to ailing financial institutions. Austria's structural budget balance adjusted for the economic cycle and one-off effects amounted to around –1% of GDP in 2016, hence falling considerably short of Austria's medium-term objective of –0.45% of GDP. Yet the European Commission gave special consideration in its assessment to net extra costs originating directly from refugee migration and counter-terrorism measures, hence allowing for a temporary deviation from the adjustment path toward the medium-term budgetary objective. Austria's general government debt ratio edged down by 0.9 percentage points, to 84.6% of GDP, in 2016.

The general government deficit ratio will improve considerably in 2017, namely to 0.9% of GDP. This is attributable to the improved economic conditions, ongoing refinancing at low interest rates and the measures taken to fund the 2016 tax reform.[2] However, the reduction of the deficit is being slowed down by the cuts in employer contributions to the family burden equalization fund, effective from January 1, 2017, and the lagged tax relief effect. Slowing down somewhat in 2017, government consumption is set to contribute only marginally to the economic expansion. By contrast, the lagged tax relief effect fuels real private consumption, one of the pillars of economic recovery. The general government debt ratio is forecast to drop noticeably, to just above 80% of GDP, on the back of a marked increase in the level of nominal GDP as well as the progressive divestment of impaired assets by the government-run bad banks.

The budget balance is expected to improve further also in 2018 and 2019 thanks to continued favorable cyclical developments and decreasing interest payments. At the same time, a number of measures listed in the government's work program for 2017 that have already been agreed will dampen deficit reduction in the coming years.[3] These measures include bonus payments for employers creating new jobs, additional investment subsidies and the creation of 20,000 subsidized jobs for long-term unemployed people over 50. As debt continues to be refinanced at low interest rates, the structural budget balance will go down, too, however. At present, Austria is expected to reach its domestic medium-term budgetary objective of –0.45% of GDP in 2019. The general government debt ratio is set to shrink further, to about 76% of GDP by 2019.

[1] *Compiled by Paul Eckerstorfer, Economic Analysis Division, paul.eckerstorfer@oenb.at.*

[2] *Some of the funding measures (e.g. adjustments to the depreciation of real estate) will not be fully reflected in the budget before 2017.*

[3] *The forecast reflects all measures for which sufficient details were available by May 23, 2017.*

4.2 Investment cycle to peak in 2017

The quarterly growth rates of the Austrian economy have been accelerating steadily since early 2015.[10] This gradual improvement was accompanied by an investment cycle preceding the economic recovery, as is typically the case. In early 2015, the quarterly growth rate of gross fixed capital formation had turned positive again and from then onward, it gradually moved upward, to reach 1.1% in the fourth quarter of

[10] *The second and third quarter of 2015 as well as the second quarter of 2016 represent temporary exceptions.*

Table 4

Austria's current account

	2016	2017	2018	2019
	% of nominal GDP			
Balance of trade	2.9	3.3	3.6	4.0
Balance of goods	–0.1	0.2	0.3	0.5
Balance of services	2.9	3.1	3.3	3.5
Balance of primary income	–0.2	–0.2	–0.2	–0.2
Balance of secondary income	–1.0	–1.0	–1.0	–1.0
Current account balance	1.7	2.1	2.4	2.8

Source: 2016: OeNB; 2017 to 2019: OeNB June 2017 outlook.

2016. Investment in equipment largely carried the investment cycle in 2015 and 2016, with investment in motor vehicles (see footnote 7) being a determining factor. Over the course of 2016, investment in machinery was gaining importance as well. Yet, the new rules on company car taxation will positively impact on investment growth also in 2017. According to the statistics on new vehicle registrations, the number of new registrations increased once again in early 2017.[11]

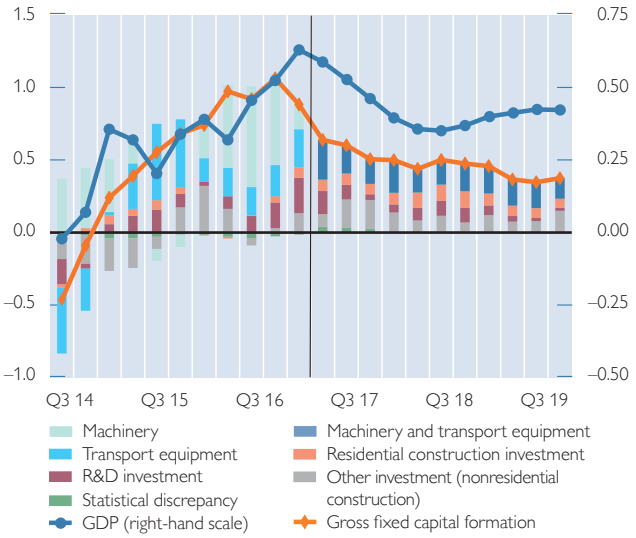
Gross fixed capital formation is expected to expand at a rapid pace also in 2017. The latest quarterly survey published by the European Commission bodes well for Austria: (1) capacity utilization in manufacturing outperforms the long-term average, as last seen in late 2011; (2) a marked decrease in unused production capacity goes hand in hand with an increase in the number of months' production assured by orders on hand and continued high orders (from abroad); (3) rising demand

Chart 4

Gross fixed capital formation

Quarterly investment growth

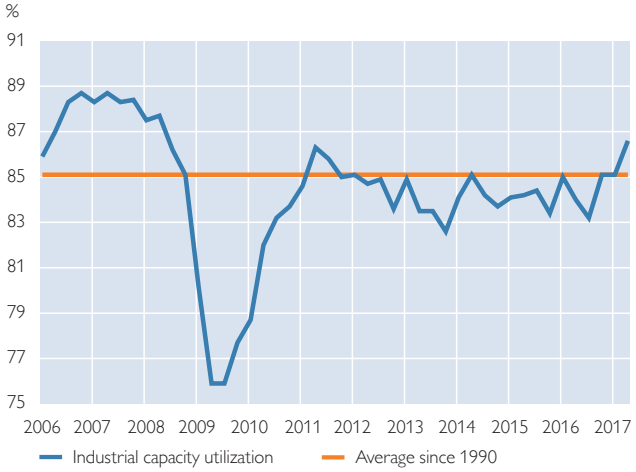
Growth in %, contributions to growth in percentage points



Source: Eurostat, OeNB.

Industrial capacity utilization

%



Source: European Commission.

[11] *The registration of new passenger cars increased by 14.3% against the fourth quarter of 2016 and by 12.8% year on year.*

was indicated as the main driver influencing industrial investment; and (4) investment is now mainly aimed at increasing output rather than at replacing existing machinery, which was still the case in 2016.

These favorable developments have already fed through to the economy (e.g. strong industrial output growth in the area of intermediate and capital goods) and to the confidence indicators (e.g. manufacturing purchasing managers' index, business outlooks of the Austrian Institute of Economic Research and the Federation of Austrian Industries). This notwithstanding, growth in equipment investment is expected to slow down over the forecast horizon. Historical data show that equipment investment cycles are typically short, yet very dynamic.

In light of the rising demand for residential housing and continued favorable financing conditions, growth of residential construction investment is forecast to increase from 0.4% in 2016 to 2.0% in 2018. Signs of a modest recovery in residential construction investment were already evident in late 2016, early 2017. In addition, the residential housing initiative launched by the government in 2015 is expected to have positive effects on residential construction investment in the years ahead.[12]

To buttress the upturn, the federal government, introduced an investment stimulus package in late October 2016, to be implemented in 2017 and 2018. This package comprises additional investment subsidies[13] and investment incentives for municipalities.[14] The OeNB expects the investment package to boost GDP growth by some 0.1 percentage point each in both 2017 and 2018. R&D investment has developed in sync with equipment investment in recent years, albeit at lower growth levels. A similar pattern is expected for the 2017–2019 period.

In sum, the OeNB projects overall gross fixed capital formation to expand by 3.3% in 2017, by 2.0% in 2018 and by 1.7% in 2019. The investment ratio is thus expected to climb slightly from 22.9% in 2016 to 23.2% in 2017.

4.3 Private consumption is driving growth

In the period of low real growth (2012 to 2015), the development of households' real disposable income was very volatile. Real disposable income grew in 2012 (1.3%), shrank in 2013 (–1.9%) and thereafter stagnated in 2014 (–0.1%) and 2015 (0.2%). A noticeable increase (2.3%) was recorded in 2016, as a result of the income tax reform. Real disposable income growth is influenced by a combination of factors, including the changes in the inflation rate, wages, employment and property income (mixed income of the self-employed, interest and dividend income) as well as income tax design and public transfers to households. 2013 and 2014 were characterized by relatively weak growth of households' nominal dispos-

[12] *Funding is organized by the Residential Investment Bank (WBIB), which was established in September 2016.*

[13] *The subsidies are made available for investment in excess of the average of the past three years. Large companies (with a staff of over 250) are eligible for 10% of the eligible investment volume, and small and medium-sized enterprises (SMEs) for 15%, subject to a cap of EUR 70,000 for medium-sized companies and EUR 67,000 for small companies. The total volume of this measure, which is meant to provide an incentive for investments worth EUR 1.2 billion, equals EUR 175 million. The 2017 subsidy program for SMEs has already been exhausted, but new applications will be accepted under the 2018 program. The subsidy program for large companies is limited to 2017 and will be opened for applications once the funding guidelines have been finalized. The fiscal impact of these programs is unlikely to materialize before 2018, because the subsidies will be rewarded retroactively.*

[14] *For municipalities, investment incentives amounting to EUR 175 million have been appropriated for 2017 under the investment stimulus package.*

Table 5

Investment activity in Austria

	2016	2017	2018	2019
	Annual change in %			
Total gross fixed capital formation (real)	+3.1	+3.3	+2.0	+1.7
of which: investment in plant and equipment	*+6.6*	*+5.8*	*+2.1*	*+2.0*
residential construction investment	*+0.4*	*+1.2*	*+2.0*	*+2.0*
nonresidential construction investment and other investment	*+1.7*	*+1.5*	*+2.1*	*+1.5*
investment in research and development	*+1.9*	*+3.2*	*+1.6*	*+1.3*
public sector investment	*+2.0*	*+1.5*	*+1.0*	*+1.0*
private sector investment	*+3.3*	*+3.6*	*+2.2*	*+1.8*
	Contribution to the growth of real gross fixed capital formation in percentage points			
Investment in plant and equipment	+2.3	+2.1	+0.8	+0.7
Residential construction investment	+0.1	+0.2	+0.4	+0.4
Nonresidential construction investment and other investment	+0.5	+0.4	+0.5	+0.4
Investment in research and development	+0,4	+0.6	+0.3	+0.3
Public sector investment	+0.3	+0.2	+0.1	+0.1
Private sector investment	+2,9	+3.1	+1.9	+1.6
	Contribution to real GDP growth in percentage points			
Total gross fixed capital formation	+0.7	+0.8	+0.5	+0.4
Changes in inventories	+0,3	+0.0	+0.0	+0.0
	% of nominal GDP			
Investment ratio	22.9	23.2	23.2	23.2

Source: 2016: WIFO; 2017 to 2019: OeNB June 2017 outlook.

able income and relatively high HICP inflation, causing the real disposable income of households to contract. The modest increase in nominal disposable income was attributable to (1) the pattern of employment growth, which was largely driven by part-time work and by job growth in areas characterized by low productivity, (2) falling property income as well as (3) bracket creep dampening income. Growth in real disposable household income in 2016 benefited from the income tax reform effective from 2016,[15] low inflation, an increase of the number of full-time jobs and increased hiring in the manufacturing industry.

Given the sluggish development of real disposable household income, real private consumption contracted in 2013 and 2014, and stagnated in 2015, before starting to accelerate in 2016.

In 2017, nominal household income growth is set to be somewhat weaker than in 2016, yet still comparatively robust. The full impact of the income tax reform is going to manifest itself in 2017, thus benefiting household income growth this year. Employment growth will stay high, too, with the increase in the compensation of employees matching that of last year. At the same time, the HICP inflation rate will accelerate to 2%, thus clearly dampening the increase in real household income (1.0%). 2018 will bring a comparatively strong rise in the compensation of employees, as the higher inflation rates recorded in 2017 and productivity gains will translate into higher collective

[15] *In 2016, the tax reform reduced taxes by some EUR 4.2 billion. Ultimately, the tax burden will be lowered by around EUR 5 billion (some of the effects will not materialize until 2017).*

wage and salary settlements for 2018. Growth in income of the self-employed will, by contrast, slow down in 2018. At the same time, the slight deceleration of inflation year on year will benefit real disposable household income. Likewise, property income will rebound somewhat in 2018–2019 on the back of more dynamic economic growth.

The saving ratio edged up slightly in 2016 on account of the income tax reform, as households did not spend all the money they saved in taxes in the same year. The forecast is based on the assumption that households faced with strong income gains step up consumption only with a certain lag. For this reason, the saving ratio is expected to edge down in 2017 and remain unchanged in the next few years.

The income gains fueled private consumption already in 2016. The quarterly growth rates of private consumption, ranging from 0.4% to 0.5%, were well above the long-term average (2000–2016: 0.3%). Growth remained at a high 0.4% quarter on quarter also in the first three months of 2017. For 2017 as a whole, private consumption growth is pegged at 1.6% (2016: 1.4%). In the two subsequent years, households' demand will slow down somewhat to 1.2% per annum. Private consumption is therefore a major pillar of growth throughout the forecast horizon.

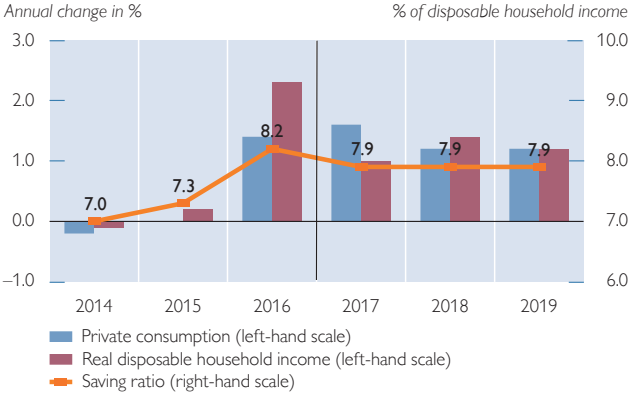
5 Unemployment goes down for the first time since 2011

In the past few years, both the number of employed individuals[16] and the number of registered unemployed individuals increased in tandem. Payroll employment grew at an annual 1.1% between 2012 and 2016, subdued economic activity notwithstanding. In comparison, the number of hours worked rose by a mere 0.4% per annum. Employment growth came mainly on the back of new part-time jobs, which explains this discrepancy. From 2012 to 2016, the share of part-time workers in payroll employment advanced by close to 3 percentage points to 28.9%.

Chart 5

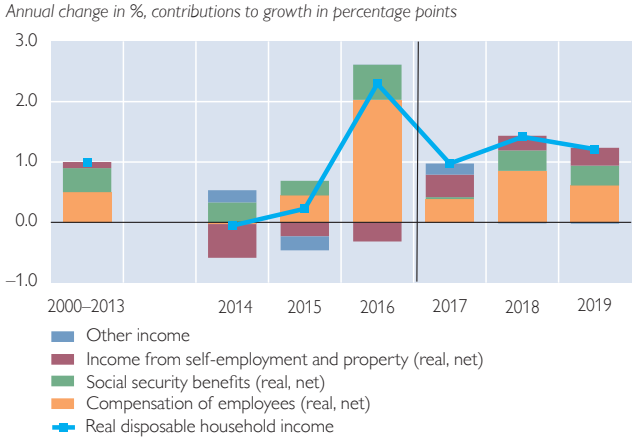
Private consumption

Disposable household income, private consumption and saving ratio



Source: WIFO, Statistics Austria, OeNB.

Net contributions to growth of real disposable net household income



Source: WIFO, Statistics Austria, OeNB.

[16] *In terms of employment growth, the national accounts refer to the number of jobs rather than the number of employed individuals.*

Table 6

Determinants of nominal household income and private consumption growth in Austria

	2016	2017	2018	2019
	Annual change in %			
Payroll employment	+1.5	+1.5	+1.5	+1.2
Wages and salaries per employee	+1.3	+1.3	+2.2	+1.9
Compensation of employees	+2.8	+2.8	+3.7	+3.2
Property income	–11.0	+1.4	+3.1	+3.2
Self-employment income and operating surpluses (net)	+6.0	+6.0	+3.4	+3.5
	Contribution to households' disposable income growth in percentage points			
Compensation of employees	+2.4	+2.4	+3.1	+2.7
Property income	–1.3	+0.1	+0.3	+0.3
Self-employment income and operating surpluses (net)	+1.0	+1.0	+0.6	+0.6
Net transfers less direct taxes[1]	+1.3	–0.8	–1.0	–0.8
	Annual change in %			
Disposable household income (nominal)	+3.6	+2.9	+3.1	+2.9
Consumption deflator	+1.3	+1.9	+1.7	+1.7
Disposable household income (real)	+2.3	+1.0	+1.4	+1.2
Private consumption (real)	+1.4	+1.6	+1.2	+1.2
	% of disposable income growth			
Saving ratio	8.2	7.9	7.9	7.9
	% of nominal GDP			
Consumption ratio	52.6	52.5	52.1	51.9

Source: 2016: WIFO. Statistics Austria: 2017 to 2019: OeNB June 2017 outlook.

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

As economic growth picked up speed in 2016, employment rose not only in the services, but also in the industrial sector. Moreover, the number of hours worked also accelerated, leading to a trend reversal. This positive momentum will continue in 2017: The number of payroll employees is projected to rise at a rate of 1.5%, and the number of hours worked is set to accelerate by 1.3%, even more vividly than in 2016 (1.0%). In 2018, employment growth will be buttressed not only by economic activity, but also by special labor market measures laid down in the government's 2017 work program (above all the 50+ employment initiative helping 20,000 long-term unemployed individuals back to work). As the recovery subsides in 2018 and 2019, the pace of job growth is projected to decline somewhat, while continuing to be robust by historical standards.

At 1.6%, labor supply expanded in 2016 at a rate last seen in 2004. Its growth will slide somewhat from 2017 (1.1%) onward, but still amount to 0.9% in 2019. According to the OeNB outlook (based on the national accounts framework), a total of 142,000 individuals will newly enter the Austrian job market from 2017 to 2019.[17] Labor migration (i.e. immigrants excluding refugees)

[17] *The change in labor supply may be broken down into a population effect (change in population at unchanged participation rates) and a participation effect (change in participation rates at unchanged population figures). The population effect, in turn, may be decomposed into a change in population excluding immigration (based on population statistics underlying the Statistics Austria forecast excluding migrations) and a change in population including immigration (Statistics Austria – baseline forecast minus forecast excluding migration effects). As to immigration, a distinction may be made between labor migration (i.e. traditional immigration) and immigration motivated by a search for refuge.*

Table 7

Labor market development in Austria

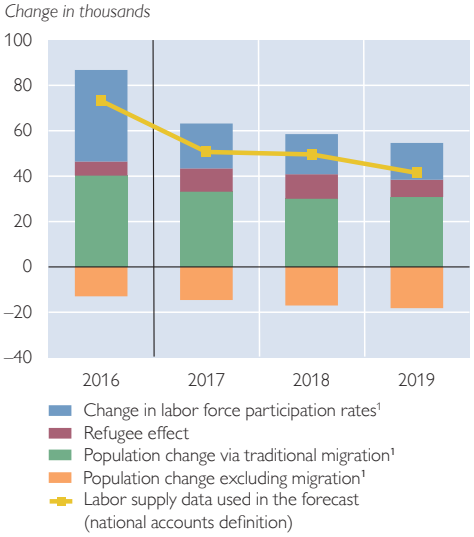
	2016	2017	2018	2019
	Annual change in %			
Total employment (heads)	+1.3	+1.3	+1.3	+1.1
Payroll employment	*+1.5*	*+1.5*	*+1.5*	*+1.2*
of which: public sector employment	*+0.4*	*+0.3*	*+2.3*	*–0.8*
Self-employment	*+0.0*	*+0.1*	*+0.2*	*+0.0*
Total hours worked	+0.9	+1.1	+1.0	+0.6
of which: Payroll employment	*+1.0*	*+1.3*	*+1.1*	*+0.8*
Self-employment	*+0.2*	*+0.0*	*+0.1*	*–0.3*
Labor supply	+1.6	+1.1	+1.1	+0.9
Registered unemployment	+7.2	–2.3	–3.7	–2.5
	% of labor supply			
Unemployment rate (Eurostat definition)	6.0	5.7	5.5	5.4

Source: 2016: WIFO, Statstics Austria; 2017 to 2019: OeNB June 2017 outlook.

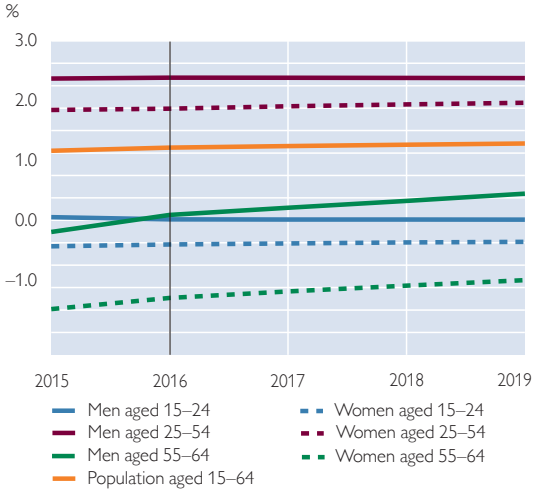
Chart 6

Structure of labor supply

Contributions to the change in labor supply (resident population)[1]



Labor force participation (resident population)[1]



Source: Statistics Austria, OeNB.

[1] Resident population: Domestic households according to microcensus data; forecast extrapolated from projected labor force participation rates and the population forecast of Statistics Austria (baseline scenario, October 2016). The labor supply data used in the forecast (national accounts definition) may differ from the microcensus-based equivalent.

in particular accounts for the rising labor supply. Between 2017 and 2019, the number of labor migrants is pegged at some 94,000 individuals. By end-2019, the influx of refugees will also have contributed to labor supply growth, namely on a scale of some 29,000 individuals.[18] On the other

[18] The OeNB forecast is based on the assumption that the political benchmarks for the intake of asylum applications set by the government for the years 2017 (35,000), 2018 (30,000) and 2019 (25,000) are met. Not all asylum seekers will enter into the labor supply figures, however.

hand, domestic demographic change will result in a labor supply reduction, with the working-age population in Austria (excluding migration) set to decline by almost 50,000 individuals over the forecast horizon. This negative demographic effect will be balanced out by the rising labor force participation of older people – an extra 54,000 individuals will push up labor supply in cumulative terms during this period. This effect is due to subside with time, however, and in 2019 the higher participation rate will fail to compensate for the shrinking domestic labor force.

2016 saw a turnaround in seasonally adjusted unemployment (Eurostat definition), which has declined since the closing quarter of that year. The national unemployment rate is likewise on the decline, having shrunk from 9.1% (2016, seasonally adjusted) to 8.6% in April 2017. The OeNB expects unemployment (Eurostat definition) to go down further over the forecast horizon by dropping from 6.0% (2016) to 5.7% (2017). Supported by labor market measures, it will decline further to 5.5% (2018) and 5.4% (2019).[19]

6 Inflation to rise to 2.0% in 2017

Austrian HICP inflation accelerated markedly between September 2016 and February 2017 (2.4%) and stood at 2.3% in April. The price growth was driven by energy, unprocessed food and industrial goods excluding energy. Moreover, unexpected one-off effects (e.g. weather-linked price hikes of unprocessed food) came into play. In

Table 8

Price, cost, productivity and profit indicators for Austria

	2016	2017	2018	2019
	Annual change in %			
Harmonised Index of Consumer Prices (HICP)	+1.0	+2.0	+1.8	+1.8
HICP energy	–4.6	+1.9	–0.8	+0.0
HICP excluding energy	+1.5	+2.0	+2.0	+1.9
Private consumption expenditure (PCE) deflator	+1.3	+1.9	+1.7	+1.7
Investment deflator	+1.0	+1.6	+1.7	+1.7
Import deflator	–1.2	+2.6	+1.9	+1.8
Export deflator	–0.5	+2.7	+2.1	+1.9
Terms of trade	+0.7	+0.1	+0.2	+0.2
GDP deflator at factor cost	+1.3	+1.6	+1.8	+1.8
Collective wage and salary settlements	+1.6	+1.5	+2.6	+2.2
Compensation per employee	+1.3	+1.3	+2.2	+1.9
Hourly compensation per employee	+1.8	+1.5	+2.5	+2.3
Labor productivity per employee	+0.1	+0.8	+0.3	+0.5
Labor productivity per hour	+0.6	+1.1	+0.7	+0.9
Unit labor costs	+1.2	+0.4	+1.8	+1.4
Profit margins[1]	+0.1	+1.1	+0.0	+0.4

Source: 2016: WIFO, Statistics Austria; 2017 to 2019: OeNB June 2017 outlook.

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

[19] *Given that Eurostat's compilation of unemployment figures is survey-based and migrants might hence be underrepresented, it is difficult to predict how quickly and to what extent unemployment among recognized asylum-seekers will actually be reflected in Eurostat's unemployment rate. The national unemployment rate is based on data provided by the Austrian Public Employment Service (AMS), reflecting the number of registered unemployed individuals. On account of the methodological difference, the reduction in the unemployment rate according to the national definition (which is not taken into account in this outlook) might be smaller than the reduction in the unemployment rate as defined by Eurostat.*

2017 as a whole, HICP inflation will run to 2.0%.[20] This translates into a significant increase over 2016 (1.0%). Compared with the OeNB's December 2016 outlook, the inflation forecast has been revised upward by 0.5 percentage points. This revision is ascribable to the increase in commodity prices, especially oil prices, in early 2017, and a considerably better economic performance. In 2018, the HICP inflation rate is expected to come in at 1.8%. The decline of inflation in 2018 primarily reflects constant assumptions regarding the development of oil prices and thus a shrinking contribution to inflation growth from energy.

Domestic factors only play a subordinate role in determining inflationary developments in 2017. The output gap will contract until 2019, but continue to be negative. The wage settlements concluded in late 2016 and early 2017 are set to influence wage developments in 2017. According to these settlements, collectively agreed wages and salaries in the metal industry will be raised by 1.7%, in trade by an average 1.4%, in the public sector by 1.3% and in most other industries by 1.3% to 1.4%. The economic recovery of 2017 is therefore hardly reflected in wage developments. At 1.5%, the average collectively agreed wages and salaries will even increase slightly less in 2017 than in 2016 (1.6%). Wage settlements are likely to be higher in 2018 and 2019, reflecting increased inflation as well as productivity gains. In particular, the high level of inflation in 2017 will result in comparatively high wage settlements in 2018. Unit labor costs are expected to rise markedly in 2018, without, however, surpassing average ULC growth measured in the period from 2012 to 2015. The wage drift – the difference between the collectively agreed increase in wages and the increase in actual wages – is essentially the result of structural factors and will remain

Table 9

Compensation of employees

	2016	2017	2018	2019
	Annual change in %			
Gross wages and salaries[1]				
In nominal terms	+2.8	+2.8	+3.7	+3.2
Consumption deflator	+1.3	+1.9	+1.7	+1.7
In real terms	+1.5	+0.9	+2.1	+1.5
Per person employed (nominal)				
Collectively agreed wages and salaries[1]	+1.6	+1.5	+2.6	+2.2
Wage drift	–0.2	–0.2	–0.4	–0.3
Per person employed (gross)[2]	+1.3	+1.3	+2.2	+1.9
Per person employed (gross, real)	+0.1	–0.6	+0.5	+0.3
Per hour (gross, nominal)	+1.8	+1.5	+2.5	+2.3
Per hour (gross, real)	+0.5	–0.4	+0.9	+0.7
	% of nominal GDP			
Wage ratio	48.1	47.6	47.7	47.6

Source: 2016: WIFO, Statistics Austria; 2017 to 2019: OeNB June 2017 outlook.

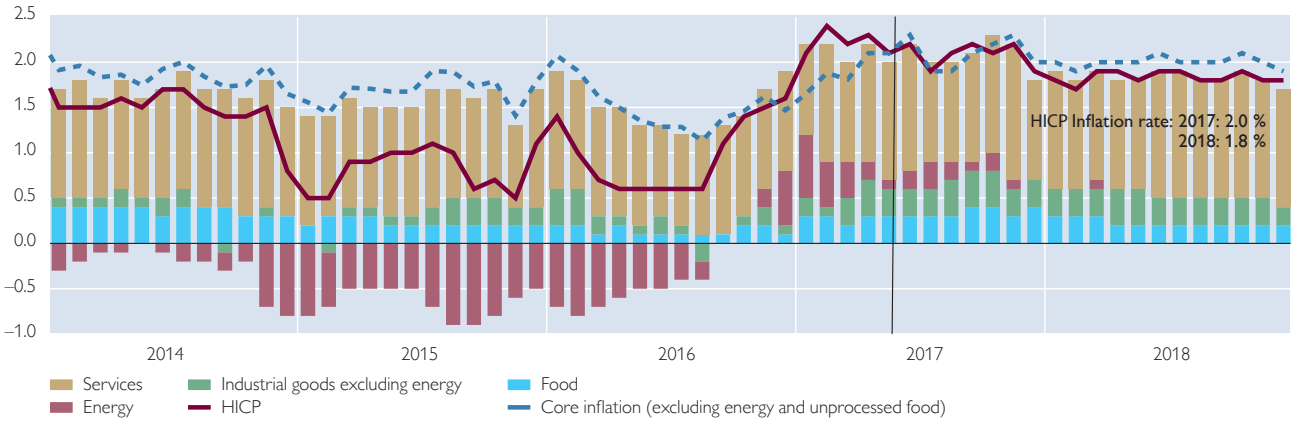
[1] *Overall economy.*
[2] *Including employers' social security contributions.*

[20] *In early 2017, the OeNB had pegged the 2017 annual inflation rate at well above 2%. As oil prices have gone down again and the oil price is expected to remain at about USD 51.5 per barrel over the forecast horizon, the inflation rate projected for 2017 has been revised downward.*

Chart 7

Austrian HICP inflation rate and contributions of subcomponents

Annual change in % (HICP and core inflation) and percentage points (contributions to inflation) *Forecast May 2017 to December 2018*



Source: Statistics Austria, OeNB.

negative throughout the forecast horizon. The wage share[21] was countercyclical in recent years, rising to 48.1% in 2015, i.e. against the backdrop of GDP growth rates of below 1% in the period from 2012 to 2015. In 2017, the wage share is expected to drop to 47.6%; thereafter, it should remain broadly unchanged.

7 Forecast risks broadly balanced

The *external risks* to the forecast are balanced. Neither the Brexit vote in the U.K. nor the unexpected presidential election outcome in the U.S.A. had a negative impact on the economy in the short run. Much to the contrary, economic growth exceeded expectations in both the United States and the United Kingdom. Regarding Austria, risks to the upside stem from an expansionary shift in U.S. fiscal policies, and risks to the downside from a potential protectionist turn in U.S. trade policies. A further intensification of existing geopolitical tensions (tensions with and in Turkey, ISIS terrorism, the Syria conflict and related refugee migration) continue to represent a serious risk to the performance of the world economy. In contrast, the risk of a disorderly correction of imbalances in China's lending and housing markets is now lower than it was in 2016.

The balance of *domestic risks* to the economy is likewise on the upside. Based on the results of the OeNB's export indicator for May 2017, continued vivid export growth would appear to be likely in the second quarter of 2017. This notwithstanding, the OeNB's spring forecast is based on more conservative expectations. Our forecast anticipates a sharp drop in investment in plant and equipment, even though a lengthier cycle of investment is not be ruled out according to survey results (the European Commission's quarterly survey). Given continued high housing demand and continued favorable financing conditions, housing investment is also subject to upside risks. The saving ratio of households increased temporarily in 2016 on the back of economic recovery and the income tax reform. Should households

[21] *Gross compensation of employees as a share of GDP.*

dissave at a stronger rate than expected – for instance if consumer sentiment were to rise more strongly than anticipated due to the economic recovery – the growth of private consumption could accelerate as well.

8 Major upward revision of GDP growth and inflation compared with December 2016 forecast

Since the OeNB's December 2016 outlook, the forecast's underlying assumptions about the expected growth of Austrian export markets in 2017 have increased markedly, namely by almost 1 percentage point. In contrast, the assumptions for interest rates have remained broadly unchanged, and the assumptions for oil prices were revised upward slightly for 2017 but revised downward somewhat for 2018 and 2019. Compared with the December 2016 outlook, the current assumptions with regard to the euro area exchange rate reflect a slight appreciation. All in all, these revised assumptions for the period from 2017 to 2019 did not have a major impact on economic growth.

The revisions to the outlook reflect changed external assumptions, new historical data and a residual. The influence of new data includes the effects of the revisions of both the historical data already available at the time of the previous economic outlook (i.e. data up to the third quarter of 2016) and the forecasting errors of the previous outlook for the periods now published for the first time (i.e. data for the fourth quarter of 2016 and the first quarter of 2017). The residual includes revised expert judgment regarding domestic variables, such as government consumption, wage settlements as well as any changes to the model.

For 2017, GDP growth has been revised up by close to 0.7 percentage points. The upward revision essentially

Table 10

Change in external economic conditions since the OeNB December 2016 outlook

	June 2017			Dec. 2016			Difference		
	2017	2018	2019	2017	2018	2019	2017	2018	2019
	Annual change in %								
Growth of Austria's export markets	+4.4	+4.2	+4.1	+3.5	+4.0	+4.0	+0.9	+0.2	+0.1
Competitor prices on Austria's export markets	+3.7	+1.9	+2.0	+2.2	+2.0	+1.9	+1.5	–0.1	+0.1
Competitor prices on Austria's import markets	+2.7	+1.7	+1.8	+1.7	+1.8	+1.8	+1.0	–0.1	+0.0
	USD per barrel (Brent)								
Oil price	51.6	51.4	51.5	49.3	52.6	54.6	+2.3	–1.2	–3.1
	Annual change in %								
Nominal effective exchange rate (exports)	+0.7	–0.2	+0.0	+0.2	+0.0	+0.0	+0.5	–0.2	+0.0
Nominal effective exchange rate (imports)	+0.2	–0.1	+0.0	+0.0	+0.0	+0.0	+0.2	–0.1	+0.0
	%								
Three-month interest rate	–0.3	–0.2	0.0	–0.3	–0.2	0.0	+0.0	+0.0	+0.0
Long-term interest rate	0.7	0.9	1.2	0.7	0.9	1.1	+0.0	+0.0	+0.1
	Annual change in %								
U.S. GDP (real)	+2.2	+2.5	+2.3	+2.0	+2.0	+2.0	+0.2	+0.5	+0.3
	USD/EUR								
USD/EUR exchange rate	1.08	1.09	1.09	1.09	1.09	1.09	–0.01	+0.00	+0.00

Source: Eurosystem.

reflects a stronger increase in economic activity in the fourth quarter of 2016 and the first quarter of 2017 (0.4 percentage points). Moreover, the leading indicators have improved significantly, as has the general assessment of the ongoing economic recovery. This caused an additional upward revision. The upward revisions of 0.2 percentage points for 2018 and of 0.1 percentage point for 2019 reflect the reassessment of the economic cycle.

Table 11

Breakdown of revisions to the OeNB outlook

	GDP			HICP		
	2017	2018	2019	2017	2018	2019
	Annual change in %					
June 2017 outlook	+2.2	+1.7	+1.6	+2.0	+1.8	+1.8
December 2016 outlook	+1.5	+1.5	+1.5	+1.5	+1.7	+1.8
Difference	+0,7	+0.2	+0.1	+0.5	+0.1	+0.0
Caused by:	*Percentage points*					
External assumptions	+0.0	+0.0	+0.0	+0.3	–0.1	–0.1
New data[1]	+0.4	+0.0	+0.0	+0.0	+0.1	x
of which: revision to historical data up to Q3 16	*+0.0*	*x*	*x*	*+0.0*	*x*	*x*
projection errors for Q4 16 and Q1 17	*+0.4*	*x*	*x*	*+0.2*	*+0.1*	*+0.0*
Other changes[2]	+0.2	+0.2	+0.1	+0.0	+0.1	+0.1

Source: OeNB June 2017 and December 2016 outlooks. Due to rounding, the sum of growth contributions subject to individual revisions may differ from the total revision.

[1] *"New data" refer to data on GDP and/or inflation that have become available since the publication of the preceding OeNB outlook.*
[2] *Different assumptions about trends in domestic variables such as wages, government consumption, effects of tax measures, other changes in assessments and model changes.*

Table 12

Comparison of the OeNB June 2017 outlook and the December 2016 outlook

	Actual figures	June 2017 outlook			Revision since June 2016 outlook		
	2016	2017	2018	2019	2017	2018	2019
Economic activity	*Annual change in % (real)*						
Gross domestic product (GDP)	+1.4	+2.2	+1.7	+1.6	+0.7	+0.2	+0.1
Private consumption	+1.4	+1.6	+1.2	+1.2	+0.5	+0.1	+0.1
Government consumption	+1.9	+0.9	+1.8	+0.8	+0.0	+0.5	–0.3
Gross fixed capital formation	+3.1	+3.3	+2.0	+1.7	+1.5	+0.5	+0.1
Exports of goods and services	+1.8	+4.2	+4.0	+3.9	+0.7	+0.1	–0.2
Imports of goods and services	+3.5	+3.7	+3.8	+3.4	+0.6	+0.2	–0.2
	% of nominal GDP						
Current account balance	+1.7	+2.1	+2.4	+2.8	–0.4	–0.3	–0.2
Contribution to real GDP growth	*Percentage points*						
Private consumption	+0.7	+0.8	+0.6	+0.6	+0.2	+0.1	+0.1
Government consumption	+0.4	+0.2	+0.4	+0.2	+0.0	+0.1	+0.0
Gross fixed capital formation	+0.7	+0.8	+0.5	+0.4	+0.4	+0.1	+0.0
Domestic demand (excluding changes in inventories)	+1.8	+1.8	+1.4	+1.2	+0.6	+0.2	+0.1
Net exports	–0.8	+0.4	+0.3	+0.4	+0.1	+0.0	+0.0
Changes in inventories (including statistical discrepancy)	+0.4	+0.0	+0.0	+0.0	–0.1	+0.0	+0.0
Prices	*Annual change in %*						
Harmonised Index of Consumer Prices (HICP)	+1.0	+2.0	+1.8	+1.8	+0.5	+0.1	+0.0
Private consumption expenditure (PCE) deflator	+1.3	+1.9	+1.7	+1.7	+0.3	+0.0	–0.1
GDP deflator	+1.4	+1.6	+1.9	+1.8	+0.2	+0.3	+0.1
Unit labor costs (whole economy)	+1.2	+0.4	+1.8	+1.4	–0.4	+0.7	+0.3
Compensation per employee (at current prices)	+1.3	+1.3	+2.2	+1.9	–0.1	+0.4	+0.0
Compensation per hour worked (at current prices)	+1.8	+1.5	+2.5	+2.3	–0.1	+0.4	+0.2
Import prices	–1.2	+2.6	+1.9	+1.8	+0.8	+0.2	+0.1
Export prices	–0.5	+2.7	+2.1	+1.9	+1.2	+0.5	+0.2
Terms of trade	+0.7	+0.1	+0.2	+0.2	+0.4	+0.3	+0.2
Income and savings							
Real disposable household income	+2.3	+1.0	+1.4	+1.2	+0.0	+0.5	+0.4
	% of nominal disposable household income						
Saving ratio	8.2	7.9	7.9	7.9	–1.0	–0.8	–0.5
Labor market	*Annual change in %*						
Payroll employment	+1.5	+1.5	+1.5	+1.2	+0.4	+0.5	+0.3
Hours worked (payroll employment)	+1.0	+1.3	+1.1	+0.8	+0.4	+0.4	+0.1
	% of labor supply						
Unemployment rate (Eurostat definition)	6.0	5.7	5.5	5.4	–0.6	–0.8	–0.8
Public finances	*% of nominal GDP*						
Budget balance	–1.6	–0.9	–0.9	–0.5	+0.3	+0.0	+0.1
Government debt	84.6	80.2	78.0	75.8	–1.4	–1.7	–1.7

Source: 2016 (actual figures): WIFO, Statistics Austria, OeNB; OeNB outlooks of June 2017 and December 2016.

Annex: detailed result tables

Table 13

Demand components (real)

Chained volume data (reference year = 2010)

	2016	2017	2018	2019	2016	2017	2018	2019
	EUR million				*Annual change in %*			
Private consumption	162,568	165,203	167,169	169,163	1.4	1.6	1.2	1.2
Government consumption	63,485	64,053	65,183	65,721	1.9	0.9	1.8	0.8
Gross fixed capital formation	72,617	75,028	76,566	77,887	3.1	3.3	2.0	1.7
of which: investment in plant and equipment	*26,068*	*27,571*	*28,157*	*28,713*	*6.6*	*5.8*	*2.1*	*2.0*
residential construction investment	*13,085*	*13,246*	*13,514*	*13,785*	*0.4*	*1.2*	*2.0*	*2.0*
nonresidential construction investment and other investment	*19,149*	*19,435*	*19,845*	*20,139*	*1.7*	*1.5*	*2.1*	*1.5*
Changes in inventories (including statistical discrepancy)	5,376	5,328	5,338	5,271	×	×	×	×
Domestic demand	304,046	309,613	314,255	318,042	2.3	1.8	1.5	1.2
Exports of goods and services	175,628	183,045	190,322	197,675	1.8	4.2	4.0	3.9
Imports of goods and services	164,421	170,577	177,037	183,017	3.5	3.7	3.8	3.4
Net exports	11,207	12,468	13,285	14,658	×	×	×	×
Gross domestic product	315,253	322,081	327,540	332,700	1.4	2.2	1.7	1.6

Source: 2016: Eurostat; 2017 to 2019: OeNB June 2017 economic outlook.

Table 14

Demand components (nominal)

	2016	2017	2018	2019	2016	2017	2018	2019
	EUR million				*Annual change in %*			
Private consumption	183,977	190,499	195,961	201,571	+2.7	+3.5	+2.9	+2.9
Government consumption	70,076	71,576	74,038	75,878	+3.5	+2.1	+3.4	+2.5
Gross fixed capital formation	80,093	84,077	87,296	90,347	+4.1	+5.0	+3.8	+3.5
Changes in inventories (including statistical discrepancy)	2,898	2,279	2,531	2,613	×	×	×	×
Domestic demand	337,044	348,432	359,827	370,409	+3.4	+3.4	+3.3	+2.9
Exports of goods and services	182,857	195,710	207,832	220,030	+1.3	+7.0	+6.2	+5.9
Imports of goods and services	170,325	181,254	191,753	201,731	+2.3	+6.4	+5.8	+5.2
Net exports	12,532	14,456	16,080	18,299	×	×	×	×
Gross domestic product	349,576	362,888	375,906	388,708	+2.8	+3.8	+3.6	+3.4

Source: 2016: Eurostat; 2017 to 2019: OeNB June 2017 economic outlook.

Table 15

Demand components (deflators)

	2016	2017	2018	2019	2016	2017	2018	2019
	2010 = 100				*Annual change in %*			
Private consumption	113.2	115.3	117.2	119.2	+1.3	+1.9	+1.7	+1.7
Government consumption	110.4	111.7	113.6	115.5	+1.6	+1.2	+1.6	+1.6
Gross fixed capital formation	110.3	112.1	114.0	116.0	+1.0	+1.6	+1.7	+1.7
Domestic demand (excluding changes in inventories)	111.9	113.8	115.7	117.6	+1.3	+1.7	+1.7	+1.7
Exports of goods and services	104.1	106.9	109.2	111.3	–0.5	+2.7	+2.1	+1.9
Imports of goods and services	103.6	106.3	108.3	110.2	–1.2	+2.6	+1.9	+1.8
Terms of trade	100.5	100.6	100.8	101.0	+0.7	+0.1	+0.2	+0.2
Gross domestic product	110.9	112.7	114.8	116.8	+1.4	+1.6	+1.9	+1.8

Source: 2016: Eurostat; 2017 to 2019: OeNB June 2017 economic outlook.

Table 16

Labor market

	2016	2017	2018	2019	2016	2017	2018	2019
	Thousands				*Annual change in %*			
Total employment	4,345.9	4,402.7	4,462.1	4,510.1	+1.3	+1.3	+1.3	+1.1
of which: private sector	3,659.2	3,714.0	3,757.4	3,810.8	+1.4	+1.5	+1.2	+1.4
Payroll employment (national accounts definition)	3,792.1	3,848.3	3,906.5	3,954.4	+1.5	+1.5	+1.5	+1.2
	% of labor supply							
Unemployment rate (Eurostat definition)	6.0	5.7	5.5	5.4	x	x	x	x
	EUR per real unit of output x 100							
Unit labor costs (whole economy)[1]	61.1	61.4	62.5	63.4	+1.2	+0.4	+1.8	+1.4
	EUR thousand per employee							
Labor productivity (whole economy)[2]	72.5	73.2	73.4	73.8	+0.1	+0.8	+0.3	+0.5
	EUR thousand							
Compensation per employee (real)[3]	39.2	38.9	39.1	39.2	+0.1	–0.6	+0.5	+0.3
	At current prices in EUR thousand							
Compensation per employee (gross)	44.3	44.9	45.9	46.7	+1.3	+1.3	+2.2	+1.9
	At current prices in EUR million							
Total gross compensation of employees	168,040	172,743	179,168	184,849	+2.8	+2.8	+3.7	+3.2

Source: 2016: Eurostat; 2017 to 2019: OeNB June 2017 economic outlook.

[1] *Gross wages and salaries divided by real GDP.*
[2] *Real GDP divided by total employment.*
[3] *Gross wages and salaries per employee divided by private consumption expenditure deflator.*

Table 17

Current account

	2016	2017	2018	2019	2016	2017	2018	2019
	EUR million				*% of nominal GDP*			
Balance of trade	10,085.0	11,902.8	13,431.1	15,560.4	2.9	3.3	3.6	4.0
Balance of goods	–185.0	645.9	1,070.5	2,016.0	–0.1	0.2	0.3	0.5
Balance of services	10,270.0	11,256.9	12,360.5	13,544.5	2.9	3.1	3.3	3.5
Balance of primary income	–610.0	–716.3	–650.3	–625.6	–0.2	–0.2	–0.2	–0.2
Balance of secondary income	–3,473.0	–3,618.4	–3,872.7	–3,924.7	–1.0	–1.0	–1.0	–1.0
Balance on current account	6,002.0	7,568.1	8,908.1	11,010.2	1.7	2.1	2.4	2.8

Source: 2016: Eurostat; 2017 to 2019: OeNB June 2017 economic outlook.

Table 18

Quarterly outlook results

	2017	2018	2019	2017				2018				2019			
				Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Prices, wages and costs	*Annual change in %*														
HICP	+2.0	+1.8	+1.8	+2.2	+2.1	+1.9	+1.9	+1.7	+1.7	+1.8	+1.9	+1.8	+1.7	+1.9	+1.8
HICP excluding energy	+2.0	+2.0	+1.9	+1.8	+2.2	+2.0	+2.2	+2.0	+2.0	+2.0	+2.0	+1.9	+1.9	+2.0	+1.9
Private consumption expenditure deflator	+1.9	+1.7	+1.7	+2.0	+2.0	+1.9	+1.7	+1.6	+1.6	+1.7	+1.7	+1.7	+1.7	+1.6	+1.6
Gross fixed capital formation deflator	+1.6	+1.7	+1.7	+1.3	+1.5	+1.7	+1.8	+1.7	+1.8	+1.7	+1.7	+1.7	+1.7	+1.7	+1.8
GDP deflator	+1.6	+1.9	+1.8	+2.0	+1.6	+1.5	+1.4	+1.5	+1.8	+2.0	+2.1	+1.9	+1.8	+1.8	+1.7
Unit labor costs	+0.4	+1.8	+1.4	+0.6	+0.5	+0.4	+0.4	+1.0	+1.6	+2.2	+2.5	+2.3	+1.7	+1.1	+0.6
Nominal wages per employee	+1.3	+2.2	+1.9	+1.1	+1.3	+1.4	+1.5	+1.9	+2.1	+2.3	+2.4	+2.3	+2.0	+1.8	+1.6
Productivity	+0.8	+0.3	+0.5	+0.5	+0.8	+1.0	+1.1	+0.9	+0.5	+0.1	−0.1	+0.0	+0.3	+0.7	+1.0
Real wages per employee	−0.6	+0.5	+0.3	−0.9	−0.8	−0.5	−0.2	+0.3	+0.4	+0.6	+0.7	+0.6	+0.3	+0.1	+0.1
Import deflator	+2.6	+1.9	+1.8	+2.3	+2.5	+2.7	+2.8	+2.2	+2.0	+1.9	+1.7	+1.7	+1.8	+1.8	+1.8
Export deflator	+2.7	+2.1	+1.9	+2.2	+2.8	+3.0	+2.7	+2.0	+2.1	+2.2	+2.2	+2.1	+1.9	+1.9	+1.8
Terms of trade	+0.1	+0.2	+0.2	−0.1	+0.2	+0.4	−0.1	−0.2	+0.1	+0.4	+0.5	+0.3	+0.2	+0.1	+0.1
Economic activity	*Annual and/or quarterly changes in % (real)*														
GDP	+2.2	+1.7	+1.6	+0.6	+0.6	+0.5	+0.5	+0.4	+0.4	+0.4	+0.4	+0.4	+0.4	+0.4	+0.4
Private consumption	+1.6	+1.2	+1.2	+0.4	+0.3	+0.3	+0.3	+0.3	+0.3	+0.3	+0.3	+0.3	+0.3	+0.3	+0.3
Government consumption	+0.9	+1.8	+0.8	+0.5	−0.8	+0.6	+0.7	+0.5	+0.5	+0.4	+0.3	+0.0	+0.1	+0.2	+0.2
Gross fixed capital formation	+3.3	+2.0	+1.7	+0.9	+0.6	+0.6	+0.5	+0.5	+0.4	+0.5	+0.5	+0.5	+0.4	+0.3	+0.4
Exports	+4.2	+4.0	+3.9	+2.1	+1.4	+1.2	+1.0	+0.9	+0.9	+0.9	+0.9	+1.0	+1.0	+1.0	+1.0
Imports	+3.7	+3.8	+3.4	+1.8	+0.7	+1.0	+1.0	+0.9	+0.9	+0.9	+0.9	+0.8	+0.8	+0.8	+0.8
	Contribution to real GDP growth in percentage points														
Domestic demand	+1.8	+1.4	+1.2	+0.5	+0.2	+0.4	+0.4	+0.4	+0.4	+0.3	+0.3	+0.3	+0.3	+0.3	+0.3
Net exports	+0.4	+0.3	+0.4	+0.2	+0.4	+0.1	+0.1	+0.0	+0.0	+0.0	+0.1	+0.1	+0.1	+0.2	+0.1
Changes in inventories	+0.0	+0.0	+0.0	−0.1	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0
Labor market	*% of labor supply*														
Unemployment rate (Eurostat definition)	5.7	5.5	5.4	5.8	5.7	5.7	5.7	5.7	5.6	5.4	5.4	5.4	5.4	5.4	5.4
	Annual and/or quarterly changes in %														
Total employment	+1.3	+1.3	+1.1	+0.4	+0.3	+0.2	+0.2	+0.4	+0.4	+0.4	+0.4	+0.3	+0.2	+0.1	+0.1
of which: private sector	+1.5	+1.2	+1.4	+0.4	+0.2	+0.1	+0.1	+0.3	+0.4	+0.5	+0.5	+0.4	+0.3	+0.2	+0.1
Payroll employment	+1.5	+1.5	+1.2	+0.5	+0.3	+0.3	+0.3	+0.4	+0.5	+0.5	+0.4	+0.3	+0.2	+0.2	+0.1
Additional variables	*Annual and/or quarterly changes in % (real)*														
Disposable household income	+1.0	+1.4	+1.2	+0.7	+0.3	+0.1	+0.1	+0.3	+0.6	+0.6	+0.6	+0.3	+0.0	+0.0	+0.0
	% of real GDP														
Output gap	−0.3	−0.2	−0.1	−0.5	−0.3	−0.2	−0.1	−0.1	−0.1	−0.2	−0.2	−0.2	−0.1	−0.1	−0.1

Source: OeNB June 2017 outlook. Quarterly values based on seasonally and working day-adjusted data.

Table 19

Comparison of current economic forecasts for Austria

	OeNB			WIFO		IHS		OECD		IWF		European Commission	
	June 2017			Mar. 2017		Mar. 2017		June 2017		April 2017		May 2017	
	2017	2018	2019	2017	2018	2017	2018	2017	2018	2016	2017	2017	2018
Main results	*Annual change in %*												
GDP (real)	+2.2	+1.7	+1.6	+2.0	+1.8	+1.7	+1.5	+2.2	+1.7	+1.4	+1.3	+1.7	+1.7
Private consumption (real)	+1.6	+1.2	+1.2	+1.3	+1.2	+1.2	+0.9	+2.0	+1.3	×	×	+1.3	+1.2
Government consumption (real)	+0.9	+1.8	+0.8	+1.1	+1.0	+0.8	+0.6	+1.5	+1.6	×	×	+1.0	+0.9
Gross fixed capital formation (real)	+3.3	+2.0	+1.7	+2.6	+2.4	+2.9	+2.2	+2.2	+3.0	×	×	+2.5	+2.1
Exports (real)	+4.2	+4.0	+3.9	+3.6	+3.4	+3.5	+3.4	+5.6	+4.6	+2.2	+2.3	+3.2	+3.1
Imports (real)	+3.7	+3.8	+3.4	+3.3	+3.0	+3.4	+3.1	+6.2	+5.0	+2.1	+2.2	+3.0	+2.7
GDP per employee[1]	+0.8	+0.3	+0.5	+0.8	+0.8	+0.3	+0.3	+0.5	+0.1	×	×	+0.7	+0.8
GDP deflator	+1.6	+1.9	+1.8	+1.4	+1.5	+1.4	+1.6	+2.0	+2.0	+1.9	+2.2	+1.4	+1.5
CPI	×	×	×	+1.7	+1.7	+1.9	+1.9	×	×	×	×	×	×
HICP	+2.0	+1.8	+1.8	+1.8	+1.7	+2.0	+1.9	+2.1	+1.8	+2.1	+1.8	+1.8	+1.6
Unit labor costs	+0.4	+1.8	+1.4	+1.2	+1.4	+1.1	+1.5	+1.4	+2.5	×	×	+1.1	+1.1
Payroll employment	+1.3	+1.3	+1.1	+1.6	+1.3	+1.4	+1.2	+1.7	+1.5	+0.7	+0.6	+1.0	+0.9
	% of labor supply												
Unemployment rate (Eurostat definition)	5.7	5.5	5.4	5.9	5.9	5.9	6.0	5.7	5.5	+5.9	+5.9	+5.9	+5.9
	% of nominal GDP												
Current account balance	2.1	2.4	2.8	1.6	1.6	×	×	1.9	1.9	2.4	2.2	2.0	2.2
Budget balance (Maastricht definition)	–0.9	–0.9	–0.5	–1.2	–0.7	–1.4	–1.1	–1.0	–0.7	–1.0	–0.7	–1.3	–1.0
External assumptions													
Oil price in USD/barrel (Brent)	51.6	51.4	51.5	57.0	59.0	57.0	60.0	51.3	50.0	55.2	55.1	55.5	55.9
Short-term interest rate in %	–0.3	–0.2	0.0	–0.3	–0.1	–0.3	–0.1	–0.30	–0.30	–0.3	–0.2	–0.3	–0.2
USD/EUR exchange rate	1.08	1.09	1.09	1.05	1.05	1.06	1.06	1.09	1.09	1.06	1.06	1.06	1.06
	Annual change in %												
Euro area GDP (real)	×	×	×	+1.9	+1.7	+1.6	+1.6	+1.8	+1.8	+1.7	+1.6	+1.7	+1.8
U.S. GDP (real)	+2.2	+2.5	+2.3	+2.2	+2.1	+2.5	+2.7	+2.1	+2.4	+2.3	+2.5	+2.2	+2.3
World GDP (real)	+3.3	+3.6	+3.5	×	×	+3.3	+3.5	+3.5	+3.6	+3.5	+3.6	+3.4	+3.6
World trade	+3.4	+2.3	+2.7	×	×	+3.3	+3.5	+4.6	+3.8	+3.8	+3.9	+3.4	+3.8

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

[1] *GDP per hour worked.*

How strong is the wealth channel of monetary policy transmission? A microeconometric evaluation for Austria

Nicolas Albacete, Peter Lindner[1]

We study the magnitude and the sources of wealth effects on consumer spending in Austria by using household-level data from the Austrian Household Finance and Consumption Survey (HFCS) 2010 and 2014. Microdata allow us to investigate whether such effects exist, and if so, whether they are heterogeneous across household groups. We find evidence for a limited but statistically significant positive (long-run) relationship between wealth and consumption in Austria: a EUR 1 increase in gross/net wealth increases mean consumption by 1 cent. We also find that this effect is driven by financial assets for which the marginal propensity to consume is estimated to be around 5 cent. Furthermore, the consumption function is concave in wealth, i.e. the marginal propensity to consume out of wealth is lower for households with more wealth. However, given that in Austria wealth is concentrated in the upper tail of the wealth distribution, the decreasing marginal propensity to consume out of wealth is counterbalanced in the aggregate. Additionally, the marginal propensity to consume out of wealth increases across the consumption distribution. Regarding the various hypotheses discussed in the literature concerning the nature of the correlation between wealth and consumption, for Austria we can find support for the precautionary savings channel only.

JEL classification: D12, E21, E44, E91
Keywords: wealth effects, consumption, housing, stock ownership

Asset prices play an important role in the transmission of monetary policy to the real economy ("wealth channel"). They can contribute to changes in consumption through the interest rate effects on households' wealth (and, analogously, to changes in investment through the effect on companies' assets). In many industrialized countries, including the U.S.A. and euro area countries, increasing annual returns on equity and decreasing aggregate saving rates were observed during the second half of the 1990s (see OECD, 2004). However, the fear that constant or declining stock prices could depress consumption and cause a slowdown in the economy did not come true. According to Paiella (2009), one possible explanation was that the effect of falling stock prices had been offset by rising house prices. Another explanation was that most fluctuations in asset values are temporary and have no effect on consumer spending (only permanent changes in wealth do). In Austria, the development of financial wealth, housing prices and private consumption seems to suggest a positive correlation between the three factors since the beginning of the available time series in 2001 (see chart 1).

In the paper at hand, we study the magnitude and the sources of wealth effects on consumer spending in Austria by using household-level data from the Austrian Household Finance and Consumptions Survey (HFCS), which allow us to investigate whether such effects – if they exist – were heterogeneous across household groups in the period under review. To the best of our knowl-

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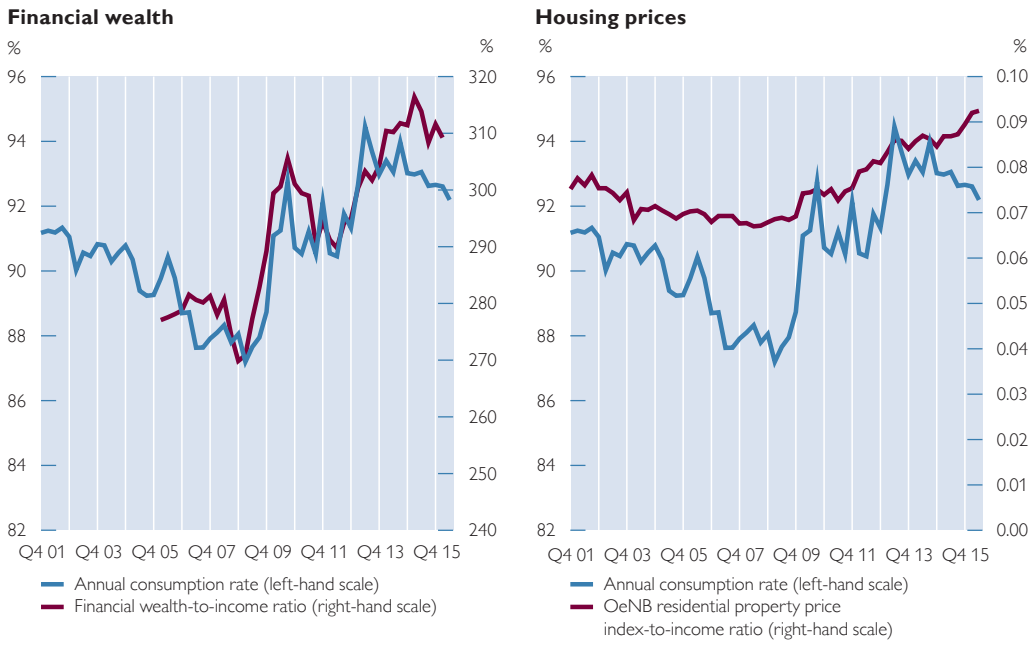
Chart 1

Wealth and consumption in Austria



Source: OeNB, Statistics Austria.

edge, the only paper estimating wealth effects on consumption in Austria is the one by Fenz and Fessler (2008), which uses aggregate data. Thus, we add to the literature by using microdata for the investigation of wealth effects in Austria. Additionally, we combine several approaches in the literature in order to attempt an identification of a causal link using an instrumental-variable approach not only for the overall wealth effect but also for the effects in specific subpopulations.

The structure of the paper is as follows: Section 1 discusses both the theoretical and empirical international literature on wealth effects. In section 2, the methodology and the data are presented, and in section 3 some descriptive statistics are shown. Section 4 discusses the results and section 5 concludes.

1 Literature review[2]

1.1 Conceptual framework

The theoretical link between wealth and consumption can be described using the life-cycle model of household spending behavior developed by Modigliani and Ando (1960) and Ando and Modigliani (1963). According to this model, households accumulate and deplete their wealth to keep their consumption more or less steady. Only if households experience an unexpected change in wealth (e.g. through unexpected changes in asset prices), will they revise their consumption plan, otherwise they do not. Extensions to the model also make it possible to explain some exceptions to this basic prediction. Such extensions allow for the possibility that households are unable to borrow as much as they would like against higher future incomes, or that

[2] *For more detailed literature reviews see Poterba (2000) and Paiella (2009).*

households may want to keep some assets as a precaution against unpredictable future adverse events or to bequeath to younger generations. With these extensions the model can explain the possibility that consumption may respond to predictable changes in income or wealth, or respond only slowly to permanent changes, or the possibility that household spending may be related to all those variables that help to predict future changes in income or wealth.

Generally, the literature distinguishes the following hypotheses for the nature of the correlation between wealth and consumption (see Paiella, 2009):

1. Direct wealth effect: Rising asset prices increase household wealth, which in turn increases consumption via the budget constraint.
2. Common causality: Asset prices and consumer spending are driven by a common macroeconomic factor that brings innovations to productivity or income growth (e.g. financial market liberalization); even households with no assets would adjust their consumption behavior as their expectations of the future change.
3. Collateral or precautionary savings channel: For borrowing-constrained homeowners, an increase in house prices relaxes credit constraints and may lead to an increase in spending because it allows homeowners to borrow more (in the form of mortgage equity withdrawal) and to smooth consumption over the life cycle; similarly, changes in asset prices may affect households' desire for other forms of precautionary savings: when the price of an asset rises, the stock of savings held in that form increases, and households may choose to reduce the stock of other assets and increase consumption.

Finally, concerning the magnitude of the marginal propensity to consume out of wealth, the basic life-cycle model predicts that it should be the same for all types of assets. However, there are several reasons why this is likely not to be the case in practice. For example, if assets are not liquid (e.g. long-term investment funds) then changes in the value of these assets may lead to slower and less intense reactions in consumption. Also, if households develop "mental accounts" that make them believe that certain directly held assets are more appropriate to use for current expenditure and others (e.g. retirement accounts) for long-term saving the reactions to changes in the valuation of these assets might be different (Thaler, 1990). Other examples for wealth effects being asset-type specific may be that households view the accumulation of some kinds of wealth as an end in itself, or for tax, bequest or other reasons (Paiella, 2009).

It is important to distinguish the marginal propensity to consume (mpc) out of wealth from the elasticity of consumption to wealth. While the mpc measures the amount of an absolute change in wealth that is spent on average consumption, the elasticity measures the percentage change in average consumption in response to a percentage change in wealth. Thus, in contrast to mpc, elasticity crucially depends on the level of wealth that each household has. This should be kept in mind for the rest of the paper.

1.2 Empirical evidence

Most studies find a statistically significant long-run relationship between total wealth and consumption. The point estimates of the effects vary depending on whether aggregate data or

microdata are employed, and there are also large differences across countries that cannot be well explained by theory. Apart from cultural differences, this variation is likely to come from differences in the measurement of wealth and in the sample definition (Paiella, 2009). Many studies on the U.S.A. (see Paiella, 2009), the country on which most of the literature focuses, find that a USD 1 increase in total wealth leads to an increase in (aggregate or average) consumption of 3 to 5 U.S. cents, a point estimate that is consistent with Modigliani (1971). The only available study estimating wealth effects on consumption in Austria (Fenz and Fessler, 2008) finds a marginal propensity to consume out of total wealth of 5 EUR cents in Austria. This result is based on the application of aggregate data.

Concerning specifically financial wealth effects, the elasticity of consumption to financial asset prices is often found to be larger in Anglo-Saxon countries than in continental Europe, where financial asset holdings are substantially smaller (see e.g. Edison and Sløk, 2001; Ludwig and Sløk, 2004 or Paiella, 2007). Furthermore, the nature of the correlation between financial wealth and consumption in Anglo-Saxon countries points toward a direct wealth effect (section 1.1) while for countries in continental Europe this nature of the correlation is still largely unexplored. Using U.S. time-series data, Dynan and Maki (2001), for example, find that changes in aggregate consumption stem mainly from changes in consumption by households that own stocks. Similarly, Maki and Palumbo (2001) find that those U.S. households whose portfolio gained the most are the same whose savings fell the most during the bust afterward (caused by the 1997 Asian financial crisis). For Italy, Paiella (2007) finds that financial wealth effects are unlikely to be direct. Indeed, although aggregate saving rates fell, stockholders continued to save and invest heavily in stocks, in contrast to U.S. stockholders. He concludes that they might have been influenced by a positive feedback effect (higher recent returns encourage higher investment).

With respect to housing wealth effects, the evidence suggests that while no clear pattern can be observed across countries for the marginal propensity to consume out of housing wealth, the elasticity of consumption to house prices may be similar in Anglo-Saxon countries and continental Europe and larger than the corresponding financial wealth effects (e.g. Case et al., 2005, for the USA and 13 other countries; Paiella, 2007 or Guiso et al., 2006, for Italy and Bover, 2006, for Spain). Furthermore, the nature of the channel through which changes in housing wealth affects consumption in Anglo-Saxon and continental European countries is not very well explored yet; indeed, it is the focus of most recent papers that use microdata. For the U.K., the findings of Attanasio and Weber (1994) and Attanasio et al. (2005) suggesting the common causality hypothesis (see section 1.1) contrast sharply with the ones of Campbell and Cocco (2007), which suggest the collateral channel hypothesis. For the U.S.A., Cooper (2013) also finds evidence supporting the collateral channel hypothesis. For Italy, Guiso et al. (2006) find evidence for a direct housing wealth effect because the effect is positive for homeowners but negative for renters.

Finally, there are several studies finding empirical support for a concave consumption function. For example, Parker (1999), Dynan et al. (2004), Mian et al. (2013) and Arrondel et al.

(2015) find that the marginal propensity to consume out of wealth is lower for households with more resources like wealth or income. An exception is Farinha (2008), who finds support for a consumption function that is concave for lower wealth values and convex for larger wealth values for Portugal.

2 Methodology and data

2.1 Method

We focus on the long-run behavior of households and use cross-sectional data (see section 2.2) to estimate the relationship between consumption and wealth. Differences in wealth across households with the same observed characteristics may reflect unobserved differences in saving behavior, which leads to reverse causality. Therefore, we follow Bover (2006) and estimate linear two-stage instrumental variable equations relating consumption in levels to different measures of household wealth in levels and sociodemographic characteristics using instruments for the wealth measures. In particular, in the first stage, we estimate household wealth as follows:

$$Wealth_i = \delta' X_i + \theta' Z_i + \nu_i \qquad (1)$$

In the second stage, we estimate a linear equation for household consumption:

$$Consumption_i = \beta \widehat{Wealth_i} + \gamma' X_i + \varepsilon_i \qquad (2)$$

The error terms are normally distributed, $\nu_i = N(0,1)$, $\varepsilon_i = N(0,1)$, and are allowed to be correlated. The matrix X_i contains an extensive set of exogenous sociodemographic characteristics in order to control for consumption differences that are due to other factors than wealth. Following Bover (2006), instead of considering explicitly permanent labor income or outstanding debt, we control for those variables in a flexible nonlinear way by including a large number of sociodemographic household characteristics. The matrix Z_i contains a set of exogenous instrumental variables that are uncorrelated with the error ε_i but are correlated with wealth. This set of instruments contains similar variables as used in Bover (2006) (local house prices and inheritance indicators for real estate properties) but also new ones (interviewers' dwelling ratings and inheritance indicators for financial assets). Intuitively, by using this set of instruments we want to control for unobservable or common determinants of wealth and consumption (see Disney et al., 2010). Below we explain in detail which controlling information we use and how we measure the above-mentioned instruments.

Furthermore, in order to see whether wealth effects differ across the distribution of consumption, we also estimate quantile regressions (see Chamberlain, 1994, and Koenker, 2005).

2.2 Data

We use the Austrian data from the first and second waves of the Eurosystem Household Finance and Consumption Survey (HFCS) carried out in 2010–11 and 2014–15, respectively, and pool both waves for the analysis in order to have a larger sample size. The implicit assumption is that by pooling the data there is no structural break in the correlation between consumption and wealth, which seems to hold when looking at chart 1. However, we also include a dummy into the regressions that equals 1 if an observation comes from the first wave and 0 otherwise in order to control for differences between both waves. Because within this framework identification is based on cross-sectional variation in levels, our

estimations will only yield information about the long-run marginal propensity to consume and has no implications for whether an effect occurs in the short run. Thus, the estimations are based on the assumption of a permanent change in wealth and do not allow a differentiation between an unexpected and an expected change in wealth.

The HFCS provides detailed information on each household's assets, liabilities, income, consumption and sociodemographic characteristics. For the analysis, we define financial wealth as the sum of the values of the following components: sight accounts, savings deposits, savings plans with building and loan associations, life insurance policies, mutual funds, debt securities, publicly traded stocks, money owed to the household and a remainder category collecting all other forms of financial wealth holdings.[3] Real wealth is defined as the sum of the following assets: main residence, other real estate property, investments in self-employment businesses, vehicles, valuables and a remainder category of other real assets. On the liability side, we define debt as the sum of collateralized debt (by main residence and by other real estate property) and uncollateralized debt (bank overdrafts, credit card debt and other uncollateralized loans). Consequently, our measure of gross wealth is obtained by summing up financial and real wealth and our measure of net wealth is obtained by subtracting debt from gross wealth.

Concerning consumption, two different measures are used for the analysis. In order to be transparent about the robustness of the results toward the choice of the consumption variable, we present the results for the following two variables of consumption: One (denominated as "consumption recorded") is based on the household's self-assessment of total nondurable consumption;[4] the other (denominated as "consumption calculated") is based on the self-assessment of several components of total nondurable consumption that are summed up to obtain an alternative measure of total nondurable consumption. These components are: the amount spent on food at home, the amount spent on food outside home and the amount given as private transfers per month. There are no studies yet in Austria comparing information on consumption collected in the HFCS with consumption according to other sources. For France, Arrondel et al. (2015) find that consumption according to the HFCS (both the recorded or computed variable) is somewhat underestimated compared to consumption according to the Household Budget Survey. Also, the HFCS nondurable consumption measure in France covers about 90% of the nondurable consumption measured with the national accounts.

As mentioned in the previous section, we use several instrumental variables for wealth when regressing on consumption (matrix Z_i in the first-stage regression). One instrument for wealth are the data on local house prices per square meter as provided by the Austrian Economic Chamber for the years 2009 and 2013 (see WKO, 2010, and WKO, 2014). The 2009

[3] *This last category is only held by a very small fraction of households.*

[4] *This self-assessment is provided as an answer to the following question: "So overall, about how much does your household spend in a typical month on all consumer goods and services? Consider all household expenses including food, utilities, etc. but excluding consumer durables (e.g. cars, household appliances, etc.), rent, loan repayments, insurance policies, renovation, etc."*

house price data are used to instrument wealth according to the HFCS 2010 (first wave) and the 2013 house price data are used to instrument wealth according to the HFCS 2014 (second wave). In each case, the instrument is lagged by one year in comparison to the reference period of housing wealth in the survey. The house price data are average transaction prices of resale apartments before taxes for each one of 113 political districts in Austria (chart A1 and table A1 in the annex A for descriptive information). This information should be exogenous since an individual real estate value has only limited impact on the average house price level. Potential self-selection of households by area of residence should be an endogeneity concern of a lesser order of magnitude relative to the one created by household wealth, as Austrian households do not very often move house and house prices change over time.[5] In the annex (see section B) we provide standard test results for the validity of the instruments. Apart from local house prices, we additionally use inheritance information and the interviewer's rating of the household's main residence available in the HFCS as instruments for real and financial wealth (table A1 in the annex). More precisely, as inheritance information, we introduce two dummy variables indicating whether the following assets have been inherited: main residence, any other assets (e.g. money, other real estate properties, valuables). The rating of the household's main residence is based on a pre-interview assessment of the dwelling by the interviewer who interviewed the household living in that dwelling.[6] In some model specifications instead of the categories we use a continuous measure of this rating which is cleaned from interviewer fixed effects.

In order to control for consumption differences that are due to other factors than wealth, we use an extensive set of exogenous sociodemographic characteristics (matrix X_i in the regression equations (1) and (2)). In our case, this is particularly important as the cross-sectional variation may confound different effects, such as e.g. cohort effects resulting from the inclusion of households at very different stages of their life cycle. The household's characteristics included are the following variables: number of persons in the household (4 dummies), number of children under 16 (continuous variable), municipality size (7 dummies), education of the household head[7] (5 dummies), occupation of the household head (4 dummies), age of the household head (continuous variable), gender of the household head (1 dummy), civil status of the household head (1 dummy), education of the household head's partner (5 dummies), occupation of the household head's partner (4 dummies), age of the household head's partner (continuous variable).[8]

[5] *According to the second wave of the HFCS, less than 1.5% of homeowners acquired their main residence approximately one year before the interview, around 3.5% around two years, and 5.2% around three years before the interview.*

[6] *The interviewer's assessment is provided as an answer to the following question: "Classify this dwelling into one out of five categories: (1) luxury, (2) upscale, (3) mid-range, (4) modest, (5) low-income."*

[7] *In this analysis, the household head has been chosen to be the financially knowledgeable person (FKP) selected by the household to answer all household-level questions, such as the consumption questions.*

[8] *Please note that we do not explicitly consider either permanent labor income or outstanding debt in our equation because our focus is on the estimation of effects of wealth and its components (Bover, 2006). However, we control for those variables in a flexible nonlinear way by including a large number of sociodemographic characteristics of the households surveyed.*

All the results make use of the final household weights provided by the HFCS (Albacete et al., 2016) and are therefore representative of the population. Moreover, the sample design (500 replicate weights) is taken into account for the calculation of standard errors.

3 Descriptive statistics

Table 1 shows some descriptive statistics of the consumption and wealth variables used in the analysis. For example, Austrian households assessed their total nondurable consumption to be around EUR 900 per month at the mean and EUR 800 at the median in 2010 (first wave) and to be around EUR 1,000 per month at the mean and EUR 900 at the median in 2014 (second wave). The mean and median consumption levels of our second indicator of total consumption (calculated) are very close to each other over the two waves, with the median being identical at EUR 500. We thus see that in general, the sum of the consumption parts is below the self-assessed consumption indicator, which points to the inclusion of additional expenditure in the latter one. With respect to wealth, one can see that households' mean real assets are about five to six times larger than their financial assets. The large difference between median and mean (net) wealth is an indication of the highly unequal distribution of (net) wealth across households.[9]

Additionally, looking at the consumption patterns across standard sociodemographic indicators also gives us a first idea of consumption differences (table 2). Mean and median consumption levels increase with wealth, income and education level. With respect to the household reference person's age, the relationship between consumption and age provided in this simple cross tabulation shows an inverse U-shaped pattern. As expected, household size

Table 1

Descriptive statistics for consumption information and wealth indicators in the HFCS (rounded)

	First wave		Second wave		First and second waves	
	Mean	Median	Mean	Median	Mean	Median
	EUR					
Expenses for food at home	380	350	370	350	380	350
Expenses for food outside home	140	100	130	100	130	100
Expenses for monthly transfers unconditional	40	0	30	0	40	0
Expenses for monthly transfers conditional	370	250	290	190	330	200
Total consumption expenditure (calculated)	560	500	530	500	550	500
Total consumption expenditure (survey response)	930	800	990	900	960	850
	EUR thousand					
Gross household income	43.9	32.3	43.3	35.7	43.6	34.1
Real assets	235.1	52.1	237.3	60.0	236.2	55.8
Financial assets	46.7	13.3	38.4	15.3	42.5	14.3
Gross wealth	281.8	92.8	275.7	100.4	278.7	96.0
Net wealth	265.0	76.4	258.4	85.9	261.7	81.4

Source: HFCS Austria 2014 and 2010, OeNB.

Note: All estimates are unconditional in the sense that all households are taken into account, even those who, e.g., own real assets with a value of 0.

[9] *See Fessler et al. (2016) for a much more detailed analysis of the wealth composition and wealth concentration in Austria and Arrondel et al. (2016) for a similar analysis in the euro area.*

Table 2

Descriptive statistics for consumption expenditure broken down by socioeconomic indicators (first and second waves taken together; rounded)

	Total consumption recorded		Total consumption calculated	
	Mean	Median	Mean	Median
Single households	690	640	400	350
Two-person households	1,020	900	580	500
Three-person households	1,140	1,000	660	600
Four-person households	1,280	1,200	700	650
Households with 5 persons or more	1,420	1,300	810	700
0–34 years	880	800	500	450
35–49 years	1,060	980	610	550
50+ years	940	800	530	450
Male household reference person	1,020	900	600	500
Female household reference person	910	800	510	450
Household reference person with primary education only	820	810	480	390
Household reference person with secondary education	910	800	520	450
Household reference person with tertiary education	1,110	1,000	620	550
Owners (including free usage)	1,060	980	590	500
Renters	840	750	500	440
Households without risky financial assets	910	800	520	450
Households with risky assets	1,210	1,100	690	600
1st income quintile	600	550	340	300
2nd income quintile	780	710	440	400
3rd income quintile	960	900	540	500
4th income quintile	1,100	1,000	620	560
5th income quintile	1,350	1,200	790	700
1st net wealth quintile	710	640	430	370
2nd net wealth quintile	830	790	490	430
3rd net wealth quintile	940	850	530	490
4th net wealth quintile	1,040	990	580	520
5th net wealth quintile	1,260	1,130	710	600

Source: HFCS Austria 2014 and 2010, OeNB.

displays a strong correlation with consumption, as more persons consume more. In the regression analysis we thus include various indicators for household size as control variables (see also section 2.2). Finally, households headed by women seem to spend less on consumption goods than those with male household heads, both at the mean and median levels for both consumption indicators. As we also investigate the wealth effect channels discussed in the literature, we include a breakdown according to the ownership structure of the households' main residence and holdings of risky financial assets for completeness.

4 Results

In the first subsection of section 4, we present the results regarding overall wealth effects based on the instrumental-variable (IV) approach. For comparison, we also show the results of the simple OLS approach in order to see the potential endogeneity bias. In the second subsection, we present IV regression estimates of wealth effects on consumption across the wealth distribution. In the third subsection, we show the results based on quantile regressions estimating the wealth effects for various consumption quantiles. Finally, in the fourth subsection, again based on IV regressions, we pres-

ent the results of our attempt to find evidence regarding the nature or channel of the correlation between wealth and consumption (see also section 1.2). In all the regressions we estimate the wealth effect of net wealth and gross wealth in a separate but similar model, exchanging only the wealth indicator. For modelling the difference in real and financial wealth, we estimate one model including both wealth indicators.[10]

4.1 Overall wealth effects on consumption

The results of the estimation of the first stage equation (1) will not be discussed here but can be found in the annex (section C). Likewise, the results concerning the tests for the validity of the instrumental-variable approach can also be found in the annex (see section B).

The results of the estimation of the second-stage equation (2) are reported in table 3. All regressions control for the wave indicator and the extensive set of sociodemographic control variables.

We find evidence for a limited but statistically significant positive wealth effect on consumption in Austria: the estimated marginal propensity to consume out of net wealth is about 0.01 (column 1), meaning that an additional EUR 1 of net wealth would be associated with 1 cent of additional annual consumption. The effect is the same when considering gross wealth instead of net wealth (column 2). When considering the components of wealth,

Table 3

Results of the IV and OLS regressions

	Total consumption recorded						Total consumption calculated					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	IV	IV	IV	OLS	OLS	OLS	IV	IV	IV	OLS	OLS	OLS
Real assets			0.000			0.001**			–0.001			0.001**
Standard error			(0.002)			(0.000)			(0.002)			(0.000)
Financial assets			0.050***			0.008***			0.035**			0.005***
Standard error			(0.018)			(0.003)			(0.014)			(0.002)
Gross wealth		0.010***			0.001***			0.007***			0.001***	
Standard error		(0.003)			(0.000)			(0.002)			(0.000)	
Net wealth	0.010***			0.001***			0.007***			0.001***		
Standard error	(0.003)			(0.000)			(0.002)			(0.000)		
Dummy for wave	×	×	×	×	×	×	×	×	×	×	×	×
Extended set of controls	×	×	×	×	×	×	×	×	×	×	×	×

Source: HFCS 2014 and 2010, OeNB.

*Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*
The real estate price level, information on inheritances and paradata for the quality of a household's main residence are used as instruments for the models with real and financial assets. The information on inheritances is excluded as an instrument for the models with gross or net wealth.

[10] *As is discussed in the annex the appropriate set of instruments changes from the models on net and gross wealth to the model for real and financial wealth.*

namely real and financial assets, we find that the corresponding marginal propensities to consume differ substantially between each other (column 3). While the estimated marginal propensity to consume out of financial wealth is relatively large (5 cent), the marginal propensity to consume out of real wealth is almost zero and statistically insignificant. When using the alternative consumption definition ("consumption calculated" in columns 7–9), the results are very similar, although the magnitude decreases to some degree. The OLS estimates (columns 4–6 and 10–12) are generally lower than the IV estimates, suggesting that there is evidence of endogeneity in wealth and, therefore, OLS might underestimate wealth effects. This is also supported by the endogeneity tests (section B in the annex).

Our estimates of the marginal propensity to consume out of total wealth for Austria are lower than the ones obtained by Fenz and Fessler (2008), who use aggregate data. We attribute this fact to differences in the measurement of wealth and in the sample definition. A comparison with studies on other countries (see also literature review in section 1.2) shows that the marginal propensity to consume out of total wealth for Austria is slightly below the spectrum of the estimated propensities in the U.S.A. The estimated propensities for Austria, however, seem to be in line with the results for other European countries (e.g. Guiso et al., 2005, for Italy or Arrondel et al., 2015, for France). The higher marginal propensity to consume out of financial wealth than out of real wealth as found for Austria was also found in several studies for Italy (Guiso et al., 2005 and Paiella, 2007), but was not shown in studies for Spain or France (Bover, 2006 and Arrondel et al., 2015), where real wealth effects were found to be larger than financial wealth effects.

4.2 Wealth effects across the wealth distribution

We now consider a more flexible specification where we allow the marginal propensity to consume out of wealth to vary across the net wealth distribution. To this end, we divide all households into five groups homogenous in terms of wealth (wealth quintiles) and construct dummy variables indicating whether a household belongs to the corresponding wealth quintile. These dummies are then interacted with wealth values. Table 4 presents the results of this exercise. Again, the results are based on an IV approach where all the potentially endogenous wealth indicator and wealth distribution indicator combinations are instrumented.[11] Additionally, all the control variables are used again.

Our estimates confirm the concavity of the consumption function with respect to wealth in Austria. We obtain a statistically significant marginal propensity to consume out of net wealth decreasing from 8.4 cent for households in the second wealth quintile to 0.5 cent for households in the highest wealth quintile (see table 4, column 1).[12] The effect is very similar when considering

[11] *Each instrument is interacted with net wealth quintile dummies. As a robustness check, we have also estimated IV regressions for each wealth quintile instead of using interaction terms over the whole sample. This estimation approach leads to similar, but less efficient estimates than the ones presented in this subsection using interaction terms.*

[12] *Please note that the estimated interaction coefficients shown in table 4 refer to the highest wealth quintile, which is the omitted category. Therefore, in order to obtain the marginal propensity of one of the other wealth quintiles (e.g. 8.4 cent for wealth quintile = 1) one has to add the coefficient of the main effect term (e.g. 0.5 cent) to the coefficient of the interaction term in question (e.g. 7.9 cent).*

Table 4

Results of the IV regressions across the wealth distribution

	Total consumption recorded			Total consumption calculated		
	(1)	(2)	(3)	(4)	(5)	(6)
	IV	IV	IV	IV	IV	IV
Real assets * dummy net wealth quintile=1			−0.080			−0.165
Standard error			*(0.194)*			*(0.169)*
Real assets * dummy net wealth quintile=2			0.066			0.071
Standard error			*(0.069)*			*(0.051)*
Real assets * dummy net wealth quintile=3			0.028*			0.020
Standard error			*(0.015)*			*(0.013)*
Real assets * dummy net wealth quintile=4			0.011			0.012
Standard error			*(0.009)*			*(0.007)*
Real assets (dummy quintile=5 omitted)			0.001			0.000
Standard error			*(0.002)*			*(0.002)*
Financial assets * dummy net wealth quintile=1			0.567			0.875
Standard error			*(0.830)*			*(0.757)*
Financial assets * dummy net wealth quintile=2			0.119			0.118
Standard error			*(0.107)*			*(0.102)*
Financial assets * dummy net wealth quintile=3			−0.004			0.006
Standard error			*(0.030)*			*(0.021)*
Financial assets * dummy net wealth quintile=4			−0.008			−0.022
Standard error			*(0.042)*			*(0.027)*
Financial assets (dummy quintile=5 omitted)			0.038**			0.029**
Standard error			*(0.015)*			*(0.013)*
Gross wealth * dummy net wealth quintile=1		0.079			0.063	
Standard error		*(0.068)*			*(0.060)*	
Gross wealth * dummy net wealth quintile=2		0.080***			0.055**	
Standard error		*(0.030)*			*(0.024)*	
Gross wealth * dummy net wealth quintile=3		0.020***			0.011**	
Standard error		*(0.007)*			*(0.005)*	
Gross wealth * dummy net wealth quintile=4		0.007***			0.004***	
Standard error		*(0.002)*			*(0.001)*	
Gross wealth (dummy quintile=5 omitted)		0.006***			0.003***	
Standard error		*(0.002)*			*(0.001)*	
Net wealth * dummy net wealth quintile=1	−0.113			−0.086		
Standard error	*(0.164)*			*(0.099)*		
Net wealth * dummy net wealth quintile=2	0.079**			0.049*		
Standard error	*(0.040)*			*(0.025)*		
Net wealth * dummy net wealth quintile=3	0.022**			0.010*		
Standard error	*(0.009)*			*(0.005)*		
Net wealth * dummy net wealth quintile=4	0.007***			0.004**		
Standard error	*(0.003)*			*(0.001)*		
Net wealth (dummy quintile=5 omitted)	0.005***			0.003***		
Standard error	*(0.002)*			*(0.001)*		
Dummy for wave	×	×	×	×	×	×
Extended set of controls	×	×	×	×	×	×

Source: HFCS Austria 2014 and 2010, OeNB.

*Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*
The real estate price level, information on inheritances and paradata for the quality of a household's main residence are used as instruments for the models with real and financial assets. The information on inheritances is excluded as an instrument for the models with gross or net wealth. Each instrument is interacted with net wealth quintile dummies.

the marginal propensity to consume out of gross wealth instead of the one out of net wealth (table 4, column 2). For households in the lowest wealth quintile we cannot find any statistically significant marginal propensity to consume. There is some indication that this might be due to a larger hetero-

Table 5

Average elasticity of consumption to wealth across the wealth distribution

	Mean net wealth	Total consumption recorded			Total consumption calculated		
	EUR thousand	*Mean yearly consumption in EUR thousand*	(1) Elasticity	(2) Elasticity	*Mean yearly consumption in EUR thousand*	(3) Elasticity	(4) Elasticity
Gross wealth quintile=1	0.2	8.2		0.002	5.0		0.002
Gross wealth quintile=2	17.0	10.2		0.144	5.9		0.168
Gross wealth quintile=3	89.9	11.3		0.208	6.4		0.198
Gross wealth quintile=4	233.9	12.6		0.242	6.9		0.236
Gross wealth quintile=5	968.3	15.3		0.379	8.6		0.336
Net wealth quintile=1	–5.7	8.5	0.072		5.1	0.093	
Net wealth quintile=2	17.1	10.0	0.144		5.9	0.152	
Net wealth quintile=3	85.2	11.3	0.203		6.3	0.175	
Net wealth quintile=4	236.0	12.5	0.226		7.0	0.236	
Net wealth quintile=5	977.6	15.2	0.322		8.5	0.344	
Dummy for wave			×	×		×	×
Extended set of controls			×	×		×	×

Source: HFCS Austria 2014 and 2010, OeNB.

Note: The elasticities are obtained by multiplying the estimated marginal propensity to consume out of wealth (table 4) by the ratio of the average net wealth out of the average consumption within the considered wealth quintile.

geneity of households in this quintile.[13] When using the alternative consumption definition ("consumption calculated"), the results are very similar, although the magnitude decreases somewhat (table 4, columns 4 and 5). When disaggregating wealth into its components real and financial wealth, the pattern of decreasing effects across the wealth distribution is confirmed but it is not statistically significant anymore (table 4, columns 3 and 6).

The overall effect of a change in the value of some asset on aggregate consumption crucially depends on the weight of that asset in the aggregate portfolio. In order to investigate the implications for aggregate consumption in Austria, we compute the average consumption elasticity with respect to wealth for each wealth group employing the methodology used by Arrondel et al. (2015). Given that wealth is highly unequally distributed in Austria, with a large share of wealth being concentrated in the top percentiles (Fessler et al., 2016), the decreasing marginal propensity to consume out of wealth is counterbalanced in the aggregate: a 1% change of wealth is an amount so much higher for households in the upper tail of the wealth distribution than for those in the lower tail that it even counterbalances the mpc effect on consumption. We obtain an increasing average elasticity of consumption to net wealth ranging from 0.07% for households in the lowest wealth quintile to 0.32% for households in the highest wealth quintile (table 5, column 1), meaning that an additional 1% of average net wealth would be associated with 0.07% of additional annual average consumption for the lowest wealth quintile and with

[13] *The changing signs of the marginal propensity estimate depending on whether gross or net wealth is considered might be an indication of the lowest wealth quintile being very heterogeneous, which would lead to estimates with low statistical power. The lowest wealth quintile might group households with relatively high debt together with households with relatively low wealth.*

0.32% for highest wealth quintile. The elasticities are very similar when considering gross wealth and/or the alternative consumption definition (table 5, columns 2–4).

All in all, the consumption concavity result is in line with what is also found in most of the literature (section 1.2). An explanation of this result that is consistent with the life-cycle model of household spending behavior is the so-called precautionary savings channel (section 1.1): less wealthy households have higher precautionary savings, which do not allow them to adopt their optimal consumption; therefore, their consumption is more sensitive to wealth.[14] However, as we have seen, due to the distribution of wealth elasticities the impact on the aggregate is expected to be larger for higher wealth quintiles in Austria.

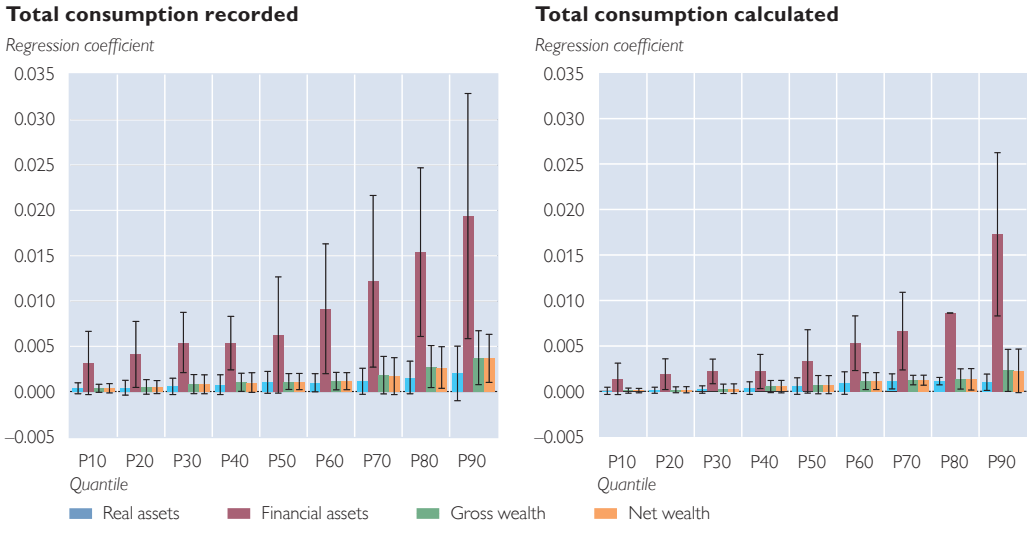
4.3 Wealth effects across the consumption distribution

Based on the estimation of quantile regressions we further investigate the marginal propensity to consume out of wealth for specific quantiles of the consumption distribution.[15] Chart 2 displays the corresponding regression coefficients for nine consumption quantiles (from the 10th percentile up to the 90th percentile) and its confidence intervals for all four wealth specifications, i.e. net and gross wealth as well as real and financial assets.

It can be seen that the marginal propensity to consume out of wealth – the extent of which depends on the wealth specification – increases across the con-

Chart 2

Results of the quantile regression



Source: HFCS Austria 2010 and 2014, OeNB.

Note: The 95% confidence intervals are constructed assuming that the coefficients and their variance come from a normal distribution.

[14] *Another explanation of this result that is consistent with the life-cycle model of household spending behavior is the collateral channel hypothesis (section 1.1). However, in a further analysis below (section 4.4) this channel is found not to be relevant in Austria.*

[15] *We have done a similar exercise estimating IV regressions across the consumption distribution. This estimation approach leads qualitatively to the same conclusions as the ones presented in this subsection using quantile regressions.*

sumption distribution. The general pattern can be observed for all specifications of wealth. For example, while the marginal propensity to consume out of financial wealth of a household located in the 10th percentile of the consumption distribution is insignificantly different from zero, a household located in the 90th percentile of the consumption distribution has a marginal propensity to consume out of financial wealth of almost 2 cent. Thus, everything else being equal, the consumption of households with higher consumption levels is more sensitive to the value of wealth than the consumption of households with lower consumption levels. One possible interpretation could be that households with lower consumption levels are low-income households that are less confident (e.g. they expect unemployment) and tend to delay spending decisions; conversely, households with higher consumption levels can be assumed to be high-income households that are more confident about the future, which encourages them to spend. The trend, however, could also reflect differences in preferences. It seems clear from the estimation that households who spend more are in general also households whose consumption behavior is more sensitive to wealth differences.

4.4 Nature of the correlation between wealth and consumption

Finally, we investigate whether next to the precautionary savings channel we can find any evidence for the other hypotheses discussed in the literature regarding the nature of the correlation between wealth and consumption (section 1.2): If wealth has a direct effect on consumer spending, real wealth effects should be most relevant for real estate owners (compared to renters) and/or financial wealth effects should be most relevant for stockholders (compared to non-stockholders). Both hypotheses cannot be supported by the results found in the HFCS for Austria (see table 6, columns 1, 2, 6 and 7): First, the housing wealth effect among owners is not statistically different from the one among renters.[16] Second, we even find some weak evidence of a larger financial wealth effect for non-stockholders compared to stockholders (see column 7) indicated by a significant positive estimate of the interaction. In the specification in column 2 there is no significant difference between stockholders and non-stockholders.

Furthermore, under the common causality hypothesis, younger households' consumption can be expected to grow more than that of older households, as a permanent revision to all expected future earnings would be more significant for the young, who have longer remaining working lives. Similarly, under this hypothesis, households expecting a positive average income growth rate one year ahead can be expected to have larger wealth effects than other households (Arrondel et al., 2015). For Austria, none of these effects seem to be true (table 6, columns 3, 4, 8 and 9) as we cannot find any statistically significant different wealth effects between young and old household reference persons.

Finally, under the collateral channel hypothesis, an increase in housing wealth would increase the value of equity available to homeowners and may encourage them to borrow more, in the form of mortgage equity with-

[16] *It must be noted that we use the local house price indicator as a proxy for real estate wealth (real assets) in this specification as they are also observed for renters and not only for owners.*

Table 6

Results of the IV regressions across household groups

	Total consumption recorded					Total consumption calculated				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV
Local house prices * dummy household=renter	–0.047					0.112				
Standard error	*(0.196)*					*(0.138)*				
Local house prices * (dummy household=real estate owner or other omitted)	0.214					0.262				
Standard error	*(0.282)*					*(0.202)*				
Financial assets * dummy household=non-stockholder		0.022					0.027*			
Standard error		*(0.020)*					*(0.015)*			
Financial assets * (dummy household=stockholder omitted)		0.040**					0.018*			
Standard error		*(0.017)*					*(0.011)*			
Net wealth * dummy household reference person aged under 35			–0.003					–0.003		
Standard error			*(0.006)*					*(0.004)*		
Net wealth * dummy household reference person aged 35–49			0.001					0.000		
Standard error			*(0.003)*					*(0.002)*		
Net wealth * (dummy household reference person age over 49 omitted)			0.008***					0.006***		
Standard error			*(0.002)*					*(0.002)*		
Net wealth * dummy household=has no positive income expectation				0.000					0.000	
Standard error				*(0.002)*					*(0.002)*	
Net wealth * (dummy household=has positive income expectation omitted)				0.008**					0.006**	
Standard error				*(0.004)*					*(0.003)*	
Real assets * (dummy household=non-mortgage holder)					–0.001					–0.003
Standard error					*(0.006)*					*(0.004)*
Real assets * (dummy household=mortgage holder omitted)					–0.001					–0.000
Standard error					*(0.004)*					*(0.003)*
Dummy for wave	×	×	×	×	×	×	×	×	×	×
Extended set of controls	×	×	×	×	×	×	×	×	×	×

Source: HFCS Austria 2014 and 2010, OeNB.
*Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*
The real estate price level, information on inheritances and paradata for the quality of a household's main residence are used as instruments for the models with financial assets and real assets. For the model with local house prices too the same instruments are used for financial wealth (but not for real assets as they are substituted by the exogenous local house prices variable). The information on inheritance is excluded as an instrument for the model with net wealth. Each instrument is interacted with the corresponding dummies.

drawal, enabling them to finance higher consumption. This effect can be expected to be stronger among mortgage holders.[17] However, not surprisingly, this is not found to be true in Austria where the form of mortgage equity withdrawal is not common among households (table 6, columns 5 and 10).

All in all, for the case of Austria, we cannot find support either for the direct wealth effect hypothesis or for the common causality hypothesis, or the collateral channel hypothesis. We only find support for the precautionary savings channel hypothesis (section 4.2). It is acknowledged that the lack of statistical significance might be due to sample size. A larger sample might help to improve significance levels.

5 Conclusion

This analysis uses microdata from the HFCS in order to evaluate one part of the monetary policy transmission mechanism, namely wealth effects for households in Austria. Applying an instrumental-variable methodology, we find positive and significant but relatively small wealth effects for households in Austria.

A separate analysis of real and financial wealth yields a considerable difference. Our results point toward a larger sensitivity of household to shocks to their financial wealth whereas changes of real assets seem to have small effects on consumption. Although in line with theory, marginal propensities to consume out of wealth decrease over the wealth distribution, the aggregate impact of changes in consumption behavior increase with wealth (as indicated with the provided elasticities): for households in the upper tail of the wealth distribution, a 1% change of wealth is an amount so much higher than for households in the lower tail that it even counterbalances the different mpc effects on consumption over the wealth distribution. Additionally, households with a higher level of consumption expenditure are on average likely to be those households who are more sensitive to changes of wealth levels.

Future similar studies could concentrate on potential changes of wealth effects over time. For such an exercise, however, a longer time horizon of microdata needs to become available first.

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[17] *This effect can be expected to be stronger among highly indebted households (compared to less-indebted households), too. The results concerning this group of households are not shown here but they are qualitatively the same as when considering mortgage/nonmortgage holders.*

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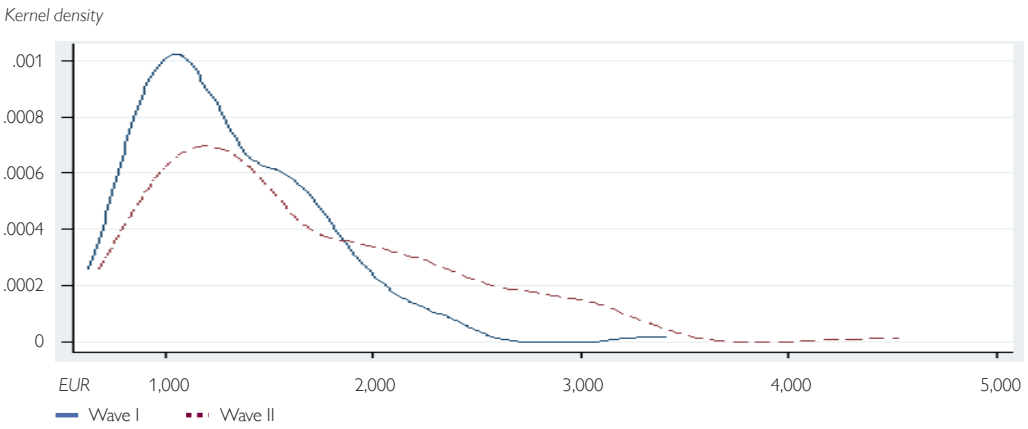
Annex

A Descriptive statistics for the instrument variables

Chart A1

Distribution of average house prices per sqm



Source: WKO 2010 and 2014.

Table A1

Descriptive statistics for instrumental variables

	First wave	Second wave	First and second waves
	Share of households in % of all households		
Inheritance			
Households' main residence	15.2	13.9	14.5
Other inheritances	22.6	28.2	25.4
	Share of households in % of all households		
Paradata: dwelling rating by the interviewer			
Luxury	5.3	2.6	3.9
Upscale	48.2	46.6	47.4
Mid-range	35.3	39.9	37.6
Modest	8.6	9.3	8.9
Low-income	2.6	1.6	2.1
	EUR/sqm		
WKO real estate price level in a political district[1]			
Mean	1,309	1,659	
Median	1,181	1,387	

Source: HFCS Austria 2014 and 2010, OeNB and WKO real estate price data.

[1] *For these estimates we use the unweighted mean and median over the political districts.*

B Instrument test results

In order to test for the validity of the instrumental-variable approach, we perform three different types of tests: the Wooldridge's robust score test of the endogeneity of wealth, a joint significance F-test of the instruments in the first stage and the Wooldridge's robust score test of overidentifying restrictions. To the best of our knowledge, it is still largely unexplored in the literature how these tests should be performed for an instrumental-variable regression model like in equation (1), which takes into account multiply imputed data, household weights and sample design (replicate weights). Our strategy is to perform all tests for each one of the five imputation implicates and for each one of the following versions of the model: (a) unweighted without cluster-robust standard errors,[18] (b) weighted without cluster-robust standard errors, (c) unweighted with cluster-robust standard errors, (d) weighted with cluster-robust standard errors.[19,20] If the test results remain relatively robust across at least a majority of the imputation implicates then they are judged to be representative of the estimated model in equation (1).

Due to space constraints, the results of the instrument tests are reported in table A2 and correspond to

[18] *For the "unweighted without robust standard errors" version of the model we use a Wu-Hausman test for endogeneity and a Sargan's test for overidentifying restrictions instead of the Wooldridge's robust score tests. In addition, when this version of the model uses the specification with real and financial wealth a Stock and Yogo's Wald test is used instead of an F-test to test the joint significance of the instruments in the first stage.*

[19] *For versions (b) to (d) of the model, when the specification with real and financial wealth is used, we cannot test the joint significance of the instruments in the first stage because it is not implemented in the statistical software (Stata). Also, for the same reason, in any specification for version (c) and (d) of the model, it is not possible to perform the Wooldridge's robust score test of overidentifying restrictions.*

[20] *Please note that the versions of the model including cluster-robust standard errors ((c) and (d)) still do not fully take into account the sample design information which is included in the replicate weights. For example, stratification and the finite population correction are ignored.*

Table A2

Instrument tests for imputation implicate 2 (weighted)

	Total consumption recorded			Total consumption calculated		
	(1)	(2)	(3)	(4)	(5)	(6)
	1st stage: F-statistic	Wooldridge's robust score test of endogeneity: chi2-statistic	Wooldridge's robust score test of overidentifying restrictions: chi2-statistic	1st stage: F-statistic	Wooldridge's robust score test of endogeneity: chi2-statistic	Wooldridge's robust score test of overidentifying restrictions: chi2-statistic
Real and financial assets	n.a.	47.90	4.646	n.a.	22.53	6.984
p-value	*n.a.*	*0*	*0.0980*	n.a.	*1.28e-05*	*0.0304*
Gross wealth	5.589	58.23	2.760	5.589	30.76	6.976
p-value	*3.84e-05*	*0*	*0.599*	*3.84e-05*	*2.92e-08*	*0.137*
Net wealth	4.912	57.84	2.954	4.912	30.33	6.935
p-value	*0.000173*	*0*	*0.566*	*0.000173*	*3.65e-08*	*0.139*
Imputation implicate	2	2	2	2	2	2
Weights	×	×	×	×	×	×
Cluster-robust standard errors						
Dummy for wave	×	×	×	×	×	×
Extended set of controls	×	×	×	×	×	×

Source: HFCS Austria 2014 and 2010, OeNB.

*Note: *** p<0.01, ** p<0.05, * p<0.1.*
The real estate price level, information on inheritances and paradata for the quality of a household's main residence are used as an instrument for the real and financial assets. The paradata for the quality of the household's main residence is excluded as an instrument for the gross and net wealth.

only one imputation implicate, but they are representative of the majority of the implicates. Furthermore, the results reported in this table are based on the version of the model with weights but without cluster-robust standard errors (version (2)) because we want to capture as many aspects of the complex survey design as possible without losing the possibility of performing all three tests for at least some of the wealth specifications (net and gross wealth).

The Wooldridge's robust score test of the endogeneity of wealth (see table A2, columns 2 and 5) gives values above 20 for the test statistic, which is F-distributed and significant at the level of 1% for all three specifications of the model and for both consumption measures. We therefore reject the null hypothesis that our instrumented wealth variables are exogenous.[21]

Additionally, to test the validity of instruments, we test for joint significance of the instruments in the first stage of the instrumental variable regression (table A2, columns 1 and 4). This gives values above 4 for the test statistic, which is F-distributed and significant at the level of 1% for all available specifications of the model and for both consumption measures. We conclude that our instruments are relevant/not weak.[22]

Finally, we use the Wooldridge's robust score test for overidentifying restrictions where the null hypothesis is that all instruments are uncorrelated with the estimated residuals table A2, columns 3 and 6). This gives values below 7 for the test statistic, which is *chi2* distributed and not significant at the level of 1% for all three specifications of the model and for both consumption

[21] *This result is obtained in all five imputation implicates for both consumption measures.*

[22] *This result is obtained in all five imputation implicates for both consumption measures.*

measures. We conclude that our instruments are exogenous.[23]

C First-stage results

The above tests for joint significance of the instruments in the first stage suggest that our instruments are not weak. Table A3 sheds further light on the relationship between our instruments and wealth and shows the instruments' coefficients in the first stage of the iv-modelling approach.[24] Concerning the interviewers' ratings of the households' main residences, it can be seen that a bad rating is related to significantly less gross or net wealth than a good rating. Similarly, a higher dwelling rating score (which means a worse rating) is positively related with both financial and real wealth. The two inheritance indicators are only used as instruments for the specification with financial and real assets. The table shows that in this specification the inheritance indicators are positively related to both wealth components. Only the relationship between financial wealth and the indicator whether the household has inherited the main residence or not is not statistically significant. In this case it seems plausible that the relevant instrument in terms of statistical significance is the indicator whether the household has inherited other types of assets (including money). Finally, the average house prices at political district level turn out to be, although positively related with all wealth definitions, *ceteris paribus,* statistically insignificant. This, however, is likely to be true because of the low number of observations due to the limited number of political districts in Austria.

Table A3

First-stage regression for the various wealth indicators

	Net wealth	Gross wealth	Financial assets	Real assets
Real estate price level	72.488	73.215	2.986	64.613
Standard error	*(54.295)*	*(54.486)*	*(4.054)*	*(52.208)*
Dwelling rating (continuous measure)			–33,944.068***	–159,268.355***
Standard error			*(7,939.108)*	*(49,307.221)*
Dummy dwelling rating=upscale	–144,431.277	–156,504.983		
Standard error	*(103,895.382)*	*(103,785.646)*		
Dummy dwelling rating=mid-range	–213,626.675**	–232,140.306**		
Standard error	*(96,613.991)*	*(96,429.351)*		
Dummy dwelling rating=modest	–228,676.393**	–251,152.012**		
Standard error	*(102,554.233)*	*(101,481.427)*		
Dummy dwelling rating=low-income	–267,819.513**	–289,203.010**		
Standard error	*(120,328.691)*	*(120,870.712)*		
Inheritance households main residence			6,339.644	290,499.494***
Standard error			*(6,116.265)*	*(107,576.150)*
Other inheritance			25,526.809***	148,713.833***
Standard error			*(7,176.661)*	*(46,229.992)*
Indicator for the wave	61,128.450*	62,029.937	16,679.558**	50,073.442
Standard error	*(36,854.020)*	*(38,620.015)*	*(8,023.274)*	*(36,625.265)*
Extended set of controls	×	×	×	×

Source: HFCS Austria 2014 and 2010, OeNB.

*Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*
The information from the paradata are only in the first stages of the model including financial and real assets.

[23] *This result is obtained in all five imputation implicates when using the consumption recorded measure and in all five imputation implicates, too, when using the consumption calculated measure for the specifications with gross or net wealth. For the specification with real and financial wealth, the result is obtained in only two out of five imputation implicates when using the consumption calculated measure.*

[24] *To be precise, for simplicity reasons, the estimates shown in table A3 are multiple imputation estimates which are not the ones used in the second stage. For the second stage each one of the five multiple imputation implicates is used separately.*

What is the financial sector's contribution to the Austrian economy?

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Walter Waschiczek[1]

Even though its contribution to the economy has decreased since the onset of the crisis, the Austrian financial sector still accounts for about 4% of value added and about 3% of the labor force. In rendering its services, the financial sector relies on inputs from the real economy, above all legal, accounting, head office and consulting services. In Austria, the domestic financial sector is still the main funding source for the real sector, even if its share has diminished over the past decade, with the decline having been somewhat more distinct on the asset side than on the liability side. For the financial sector, financing the real sector was becoming less relevant until the crisis hit.

JEL classification: G21, G22
Keywords: financial sector, intermediation, gross value added, Austria

A modern economy relies on a stable and efficient financial sector. The financial sector plays an essential role in mobilizing savings and determining the quantity and quality of investment. Companies, investors, savers and consumers rely on the availability of a broad range of financial services. However, the financial sector and the way it influences the economy at large has come under critical review of late.

This paper surveys the available evidence on the significance of the Austrian financial sector for the Austrian economy, highlighting how it evolved before the onset of the financial and economic crisis and how it has been evolving since. On the one hand, the contribution of the financial sector can be seen as the output generated by the individual firms of which the sector is made up. On the other hand, the financial sector can be analyzed by looking at the sector's function in mobilizing savings from savers or surplus units and allocating credit across space and time to real investment as well as liquidity provision.

In this article, the term *Austrian financial sector* refers to all institutions and actors that are involved in providing financial services in Austria, such as banks, insurance companies, investment funds, pension funds as well as the stock exchange. The paper takes a comprehensive view of the financial sector and does not discuss specific segments and markets. Furthermore, the paper concentrates on the domestic economy, considering the financial sector's international activities only to the extent that they have immediate effects on the wider domestic economy. This "residential" perspective implies that we take all financial institutions operating in Austria into account, not only those in Austrian ownership. The data we look at are based on the national accounts framework (supplemented by current account data). In most cases (a notable exception being input-output data, which we use for cross-sectional analysis) they allow for a long-term perspective, reaching back to the mid-1990s, so that we can cover developments since Austria's accession to the EU in 1995 or the start of monetary union in 1999.

This paper is structured as follows: Section 1 sets the scene by providing a

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brief overview of the relevant literature on the relationship between the financial sector and economic development. In the two following sections, the contribution of the financial sector to the economy at large is analyzed from the two perspectives outlined above. Specifically, section 2 looks at the contribution to value added, and section 3 takes stock of the intermediation role of the financial sector. Section 4 discusses the benefits of having a domestic financial sector. Section 5 concludes.

1 Literature findings on the benefits and drawbacks of financial institutions and markets

In a world of perfect information and zero transaction costs, there would be no need for financial institutions. In the real world, the central contribution of the financial sector consists in reducing the agency problems caused by conflicting interests and information asymmetries that characterize the relations between investors and savers. These agency problems cause information costs (because of a lack of adequate access to information about the creditworthiness of prospective borrowers and the performance of current borrowers), transaction costs, as well as costs of risk, maturity, and volume transformation. By reducing such frictions, a well-functioning financial sector fosters economic activity. The financial sector positively affects the availability of funds for corporate investments by enabling households to deposit their savings in bank accounts, mutual funds or stocks (floated on the stock exchange by banks). Monitoring and screening prospective borrowers by the financial sector contributes to higher productivity of an economy by allocating capital to the most profitable investment opportunities.

However, the relationship between financial sector activity and economic activity remains an object of discussion.[2] While early empirical research on the nexus between financial sector size and economic growth found a positive, more or less linear relationship (King and Levine, 1993; Beck et al., 2000; De Gregorio and Guidotti, 1995 and Rajan and Zingales, 1998), these findings have been questioned in the wake of recent crises such as the burst of the dot-com bubble and in particular the crisis that started in 2008.

One strand of the literature focuses on the effects of a growing financial sector on macroeconomic performance. Several authors find that the higher the growth rate of financial sector value added relative to the non-financial sectors, the greater the probability of subsequent financial busts. Easterly et al. (2000) portend that additional financial development, which is reflected in higher debt ratios of the real sector and higher leverage of the financial sector, might aggravate cyclicality, as in a downturn banks are under pressure to cut the volume of loans granted to firms. Beck et al. (2012) relate this to the fact that the financial sector has extended its scope beyond traditional intermediation services to activities such as derivatives and trading.

Recent studies found not only diminishing marginal effects of the services provided by the financial sector but also evidence that in advanced economies the relationship may even (have) become negative at some point. Arcand et al. (2015) and Cecchetti and Kharroubi (2015) suggest that the rela-

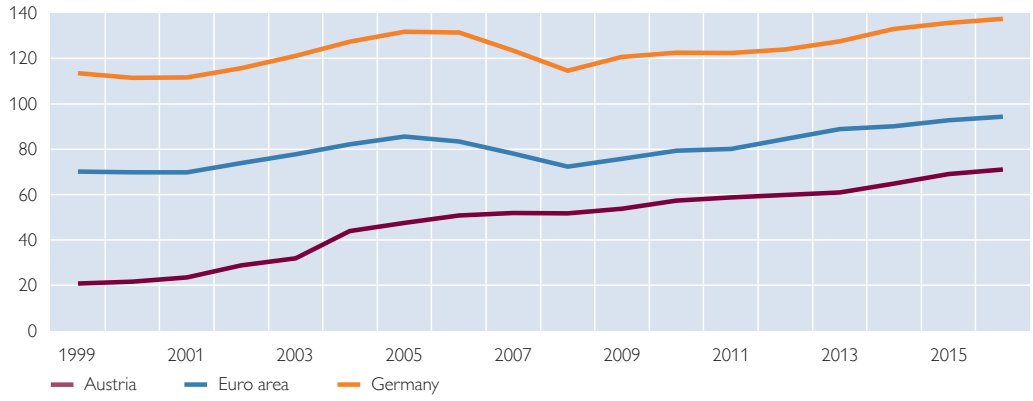
[2] *We refer here to the literature on the effects of the size of the financial sector but not of the structure of the financial system (e.g. the question of the relative merits of bank-based and market-based financial systems).*

tionship between finance and growth resembles an inverted U-shape. Interestingly, despite using different methods and looking at different country groups and periods, all studies conclude that the turning point is private sector credit of about 90% to 100% of GDP.[3] Defining credit to the private sector (nonfinancial corporations and households) as loans granted and debt securities held by Austrian financial institutions, Austria has been above this threshold for more than 10 years. Philippon (2008) argues that the financial sector competes with other sectors for scarce resources, especially for skilled labor ("brain drain").[4] A further aspect is that an expansion of financial intermediation might reflect a misallocation to less productive economic activities. In particular, additional mortgage lending often contributes less to overall economic growth than credit to young innovative companies (Beck, 2015 and Coeuré, 2014). Credit to firms removes financing constraints, thus leading to higher investment and growth, whereas better credit to households is likely to result in a lower savings rate and may therefore be associated with lower economic growth.[5] These effects are particularly binding in a situation of restrictive loan supply, in which case credit to households would restrain credit to enterprises for investment, but less so in times of ample liquidity. Much of the increase in financial intermediation has been associated with mortgage loans, which – especially if used to purchase existing housing – contribute less to production. Expressed as a percentage of loans to nonfinancial corporations, housing loans by Austrian banks to domestic

Chart 1

Lending for house purchase to households[1]

In % of loans to nonfinancial corporations



Source: OeNB.

[1] *Including nonprofit institutions serving households.*

[3] *However, these studies are based on banking sector development indicators only and did not take into account the increasing role of other financial intermediaries and the capital markets in corporate finance.*

[4] *Yet, Ritzberger-Grünwald et al. (2016) show that at least for the banking sector this has not been the case in Austria.*

[5] *See Cournède and Denk (2014), Pagano et al. (2014) and the literature cited therein. Apart from the effect on the savings ratio that arises when households can spend more than without taking out a loan, residential construction typically features low productivity, so that an increase in the structure of investment towards residential construction reduces economic growth.*

households rose from 21% in 1999 to 71% in 2016. However, in part this surge also reflects weak demand for corporate loans (see for example OeNB, 2016). While this increase was much more pronounced than in Germany and the euro area, the ratio is still markedly below that registered in Germany and the euro area as a whole (chart 1).

Another risk factor is the high interconnectedness among financial institutions (both within and across national borders). For example, many investment funds, pension funds and other financial institutions are subsidiaries of credit institutions. Banks provide financing to each other as well as to other financial intermediaries such as insurance corporations, pension funds and investment funds. The multiple layers of interconnection between the different institutions can be characterized as a complex, adaptive "system of systems" where the whole may behave differently than the sum of its parts, given dynamic properties such as amplifying feedback effects (Haldane, 2015). The interconnection of financial institutions can act as a transmitter of local shocks and disturbances to the financial system at large and thus pose a risk of contagion across sectors and beyond borders.

2 Role of the financial sector as producer and exporter of services

In this section we take up the first of the two perspectives on the macroeconomic relevance of the Austrian financial sector: we look at how the financial sector affects the economy by producing goods and (primarily) services used as final or as intermediate goods by other sectors, by buying intermediate goods from other (domestic) enterprises and by exporting its services. Within the standard EU framework for the statistical classification of economic activities (NACE), the financial sector is categorized in section K (financial and insurance activities). It includes the subsectors financial service activities other than insurance and pension funding (in the following "banking"), insurance, reinsurance and pension funding other than compulsory social security "insurance" and activities auxiliary to financial services and insurance activities ("auxiliary"). Sector K covers a broad and comprehensive range of financial intermediaries as it includes also the stock exchange, brokers, and other activities related to financial services.

2.1 The financial sector's direct contribution to value added

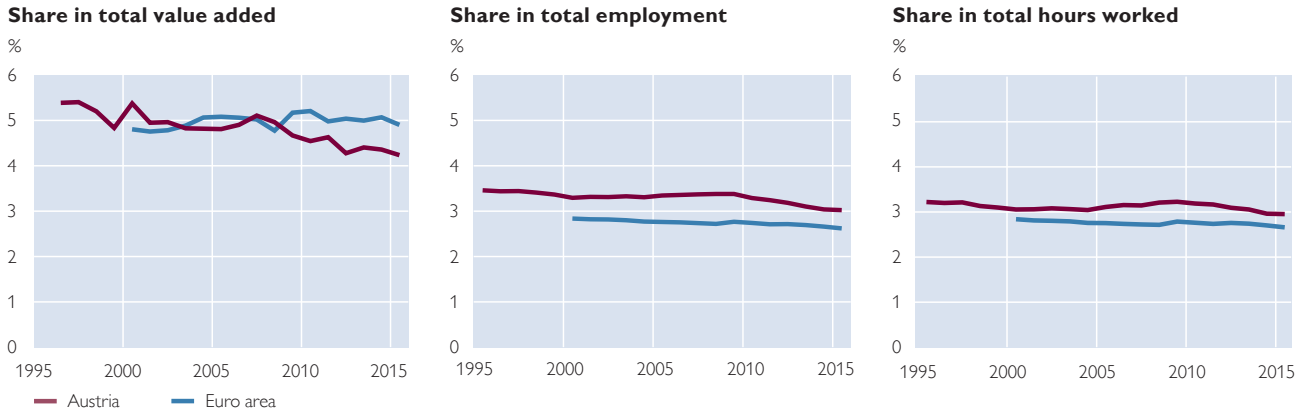
Within the national accounts framework, the standard way of measuring a sector's contribution to the economy is gross value added, defined as the value of gross output that it produces less the value of its intermediate consumption. Besides income on intermediation (such as loan provision to consumers and businesses), value added also includes fees for advisory services, insurance premia etc. In 2015, gross value added by the financial sector amounted to EUR 12.8 billion or 4.2% of total value added.[6] Over the past two decades, this share has been on a downward trend; in 1995, the financial sector had contributed 5.6% to value added. This reduction, which took place in particular after the crisis hit, was in stark contrast to the development in the euro area where the financial sector's share in

[6] *Value added by Austrian banks only includes results of banks domiciled in Austria. The business activities of subsidiaries based abroad are included as capital income from the rest of the world.*

value added has remained rather stable, fluctuating around 5% of value added. Hence, the Austrian financial sector's share in total value added fell below that of the euro area (see left-hand panel of chart 2). This is in line with the fact that financial activity growth in Austria has trailed corresponding growth in the euro area since the onset of the global financial crisis in 2008.[7] As – like in many other euro area countries – Austria's financial sector is strongly bank-based, the banking sector strongly affects the developments of the financial sector's value added.[8] In particular, this development might also reflect the way gross value added by the financial sector, and in particular the banking sector, is calculated. Banks' compensation for bearing risk constitutes part of their measured nominal output. One could argue that investing capital in a risky asset is a fundamental feature of capital markets and not specific to the activities of banks. Conceptually, it is not clear to what extent purely risk-based income flows should represent bank output (Haldane et al. 2010).[9] Thus, on the one hand, national accounts most likely overestimate the financial sector's value added. On the other hand, the reduction of the financial sector's share in value added may also reflect less risk-taking by Austrian banks. However, the lower value added established for Austria's financial sector may also reflect, in purely mathematical terms, the fact that interest levels have been lower in Austria than in a number of other euro area countries since the crisis hit.[10]

Chart 2

The financial sector's share



Source: Eurostat.

[7] *The share of Austria in total financial assets of all euro area financial institutions fell after 2008, from 2.8% to 2.1%. Andreasch (2011) shows that there is a close relationship between financial assets and liabilities of the financial sector and its share in value added.*

[8] *In 2015, the share of banking in the financial sector's gross value added amounted to about 71% in Austria and 68% in the euro area.*

[9] *The effect could be substantial. Using an interest that takes into account the risk of default and any term premium, Basu et al. (2011) calculate that current methodologies overestimate imputed bank output by 45% for the U.S.A, and Colangelo and Inklaar (2012) that imputed bank output is overestimated by 28% to 54% for the euro area on average.*

[10] *Furthermore, the development of the financial sector's value added may have been influenced by special factors such as the expansion of the central banks' balance sheet in the course of the nonstandard policy measures or the different share (and the different statistical coverage) of captive financial institutions. These include holding companies and other institutions that only provide financial services to an enterprise (group).*

The financial sector is an important employer, even though its share in total employment has come down over the past two decades.[11] In 2015, close to 130,000 persons or 3.0% of the total labor force were employed in the financial sector, according to national accounts data. The share of banking in financial sector employment was 59% in 2015 and thus somewhat lower than its share in value added, compared with about 21% employed by insurance firms and 8% by auxiliary activities. Since the financial sector's share in employment is considerably lower than in output (chart 2), this implies that labor productivity in the financial sector is higher than in the total economy.[12] The financial sector's share in hours worked was about the same as in total employment, suggesting that on average working hours in the financial sector do not differ from those in the total economy.

2.2 Interdependencies between the financial sector and the wider economy

In this section, we analyze the interdependencies between financial sector services and the production of non-

Table 1

Intermediate inputs used and supplied by the financial sector

	Used by the financial sector		Supplied by the financial sector to each sector
	in % of total use of intermediate inputs by the financial sector	*in % of total output produced by each sector*	*in % of total supply of intermediate inputs supplied by the financial sector*
Domestic real sectors			
Legal, accounting, head office, consulting	13.5	8.0	4.4
Advertising and market research	5.4	8.7	0.8
Computer programming	4.6	3.3	1.8
Security, building services, business support	3.8	5.7	0.9
Real estate	3.3	0.9	12.7
Publishing, broadcasting, telecommunication	3.3	2.6	1.0
Scientific, engineering and other services	2.6	1.3	2.2
Transport	2.5	0.7	2.5
Accommodation and food	1.4	0.6	2.3
Construction	1.2	0.3	3.3
Utilities	1.1	0.4	2.4
Manufacturing	0.9	0.0	12.7
Education, health, social work, arts, sports	0.9	0.1	7.0
Wholesale and retail trade	0.9	0.2	10.7
Personal services	0.5	0.7	1.0
Other	0.4	0.3	1.4
Agriculture and forestry	0.0	0.0	1.1
Domestic financial sector	40.2	17.9	31.8
Imports	13.6	×	×
Total	100	×	100

Source: Authors' calculations based on data from Statistics Austria.

Note: Data ordered by second column.

[11] *For an overview of bank employment in Austria, see Ritzberger-Grünwald et al. (2016). As to the banking sector OeNB data show that the reduction in employment continued in 2016.*

[12] *However, to some extent this might also be the result of the potential overestimation of the sector's value added, given the uncertainties concerning its calculation (see above).*

financial goods and services in the financial and nonfinancial corporate sectors. We use the most recent release of input-output tables, relating to 2013 (Statistics Austria, 2017). The input-output tables re-assign all activities that are characteristic of a sector to this sector and subtract the noncharacteristic activities (e.g. construction activities of the financial sector are assigned to the construction sector). Furthermore, the tables are derived under the assumption that a product has the same input structure regardless in which sector it is produced (commodity technology assumption; see Statistics Austria, 2017). Consequently, the activities assigned to a given sector may not be aligned with the framework underlying the previous sections. These aspects have to be taken into account when comparing the results in this section with those in other sections.

The left column of table 1 highlights that the financial sector uses intermediate goods from the domestic real sector, from the financial sector and from abroad (imports). The table shows a very high interconnectedness within the financial sector, as 40.2% of all intermediate goods used by the domestic financial sector stem from this very sector.[13] Inputs from the domestic real sector[14] amount to 46.2%, with the major intermediate inputs being attributable to legal, accounting, head office and consulting services (13.5%).[15] Other significant providers of intermediate inputs for the financial sector are advertising and market research services (5.4%); security, building services and business support; and computer programming and transport (4.6%). Furthermore, the left column of table 1 suggests that the bulk of intermediate inputs used to produce financial sector services is supplied domestically, as only 13.6% are imports.

The middle column of table 1 indicates how important financial sector demand is for producers in the real sector and for the financial sector itself. It shows the share of goods in real and financial sector output that is used by the financial sector as intermediate goods and services. Thus, 17.9% of goods produced by the financial sector serves as intermediate input for the financial sector. Additionally, the financial sector is an important purchaser of intermediate goods from advertising and market research (8.7% of their total output is intermediate input for the financial sector); legal, accounting, head office and consulting services (8.0%); and security, building services and business support (5.7%).

The financial sector also supplies its services to other sectors in order to facilitate the production of goods and services. The right column of table 1 shows that 12.7% of all intermediate inputs supplied by the financial sector are used as intermediate input in manufacturing, further 12.7% by real estate services, 10.7% by wholesale and retail trade, 7.0% by education, health, social work, etc., and 4.4% by legal, accounting, head office and consulting services. This reflects both the size of these activities and the dependence on financial services.

Table 1 shows the interconnectedness in the production of goods and ser-

[13] *Given the scope of this article, we focus on domestic effects and do not discuss the role of imports and exports.*

[14] *We merged the nonfinancial activities as shown in table A1 in the annex.*

[15] *However, one has to take into account that some of these inputs might be head offices within a banking or insurance group. The data do not allow scrutinizing the importance of the various activities merged under this heading.*

vices between the real and financial sector. If final demand for financial sector services changes, not only does the output for final use of these services change (direct effect of the increase in demand) but also indirect effects arise as the financial sectors needs intermediate inputs from the real and financial sectors. The production of these intermediate inputs, in turn, relies on intermediate input from the financial sector and so on. Input-output analysis covers all of these effects, thus allowing us to calculate the impact on total output stemming from a change in demand for financial sector goods and services.[16]

The domestic output multiplier (i.e. the multiplier that shows the effects on the Austrian economy) amounts to 1.7. Hence, if demand for financial sector services increases by EUR 1, total domestic production increases by EUR 1.7. Compared with nonfinancial activities, this multiplier is about average. We can further determine how this effect on the total economy is distributed over financial and nonfinancial goods and services. Table 2 shows the indirect effects that arise if final demand for financial sector services increases by EUR 1. It corroborates the findings from the analysis in the first part of this section. There are strong effects on the financial sector itself and on nonfinancial goods and services producers, in particular on the production of legal, accounting, head office and consulting services. The output of these services would increase by EUR 0.11. The increase in output takes place because these services are required by the financial sector both as intermediate inputs (as discussed at the beginning of this section) and because they are needed to produce other goods and services that are intermediate inputs in the production of financial sector services. Relatively strong impacts of a change in demand for financial sector services are also apparent for advertising and market research, telecommunication and computer programming.[17]

Furthermore, we can also analyze for which goods and services financial sector services are important intermediate inputs – either in the production of final demand or in the production of other intermediate inputs. For this pur-

Table 2

Indirect effects of an increase in final demand for financial sector services by 1 EUR

	EUR
Domestic real sectors	
Legal, accounting, head office, consulting	0.11
Advertising and market research	0.04
Publishing, broadcasting, telecommunication	0.04
Computer programming	0.04
Real estate	0.03
Security, building services, business support	0.03
Transport	0.02
Manufacturing	0.02
Scientific, engineering and other services	0.02
Utilities	0.02
Construction	0.02
Other	0.01
Wholesale and retail trade	0.01
Accommodation and food	0.01
Education, health, social work, arts, sports	0.01
Personal services	0.00
Agriculture and forestry	0.00
Domestic financial sector	0.25
Total	0.70

Source: Authors' calculations based on data from Statistics Austria.

[16] *Such an analysis relies on several assumptions, e.g. constancy of input coefficients (e.g. Statistics Austria, 2017). However, for our analysis, which aims to provide some information on the interdependencies between the financial sector and real economic activity, these limitations are not too restrictive.*

[17] *In the interpretation of these results one has to keep in mind that the table only shows domestic indirect effects. Since in the case of e.g. manufacturing most indirect effects are effective abroad, the large role of manufacturing as a supplier of intermediate inputs for the financial sector cannot be inferred from the table.*

Table 3

Proportion of indirect effects occuring in the financial sector

	% of total indirect effects
Domestic real sectors	
Real estate	11.5
Legal, accounting, head office, consulting	10.2
Wholesale and retail trade	8.8
Personal services	7.9
Education, health, social work, arts, sports	7.5
Other	7.1
Security, building services, business support	7.0
Computer programming	6.8
Scientific, engineering and other services	6.8
Accommodation and food	5.9
Manufacturing	4.5
Advertising and market research	4.5
Transport	4.3
Agriculture and forestry	4.2
Publishing, broadcasting, telecommunication	4.2
Construction	3.4
Utilities	3.0
Domestic financial sector	36.3

Source: Authors' calculations based on data from Statistics Austria.

pose, table 3 shows the proportion of additional output that occurs in the financial sector subject to rising demand for specific goods or services in the real and financial sector. In line with our discussion above, the table shows the strong interdependencies within the financial sector. Furthermore, 11.5% of all indirect effects from an increase in the demand for real estate services occur in the financial sector; likely because of the relevance of loans in real estate. Legal, accounting, head office and consulting services are not only large suppliers of inputs for financial sector services – financial sector services are also important intermediate inputs for these services. Furthermore, the table suggests that a significant part of indirect effects that arise in the production of wholesale and retail trade as well as personal services occurs in the financial sector. Yet, in sum the indirect effects in these sectors are rather small.

Overall, the input-output analysis suggests that there are quite strong interlinkages and interdependencies both within the financial sector and between the financial and nonfinancial sectors. The interconnections are most pronounced between the financial sector and legal, accounting, head office and consulting services.

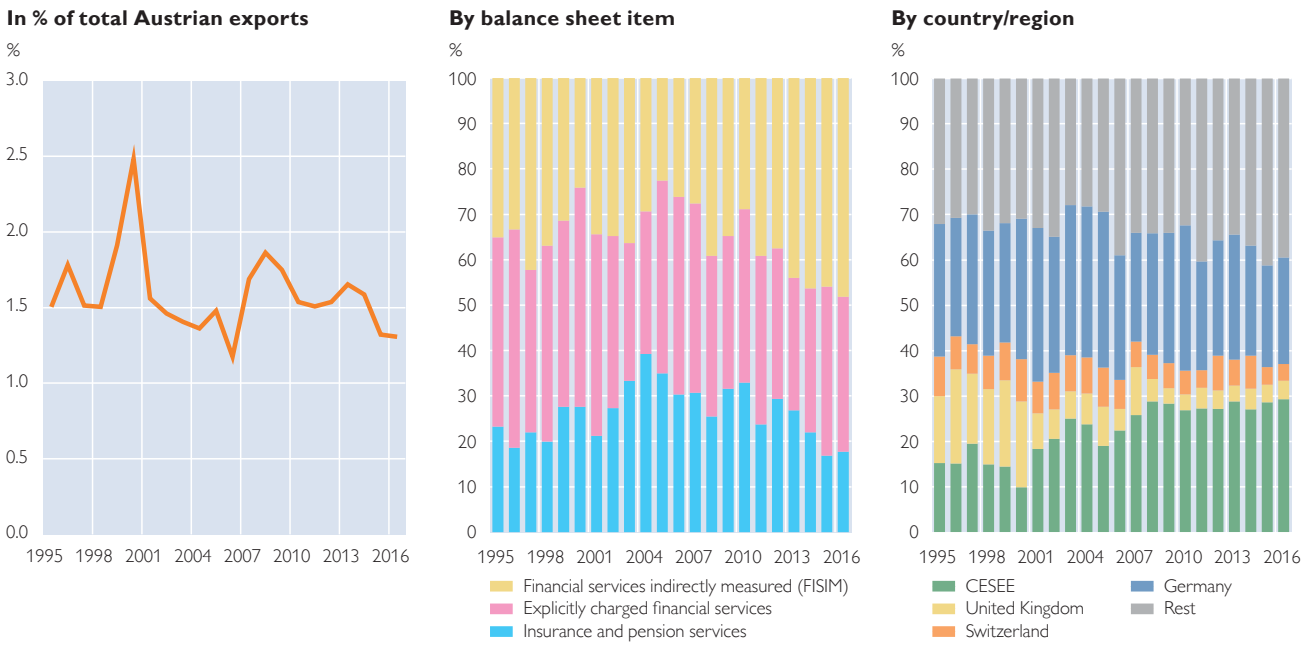
2.3 Exports of financial services

In the third part of the discussion of the financial sector's direct contribution to the wider economy, we turn to its relevance for Austria's exports of goods and services. To assess the financial sector's contribution, we added the balance-of-payment items *financial services,* which refer to cross-border services by banks and other financial institutions (e.g. brokers, clearinghouses) and *insurance and pension services.* Activities include bank fees and costs related to the issuance of bonds and underwriting, or the insurance service charge imposed on cross-border premium payments. Additionally, financial services include estimates of FISIM (financial intermediation services, indirectly measured), that is the margin between interest payable and a reference rate on loans and deposits. FISIM's share expanded over the past years significantly.

The financial sector's share in all Austrian gross exports of goods and services declined steadily after the onset of the crisis, from 1.9% in 2008 to 1.3% in 2016 (see left-hand panel of chart 3). In 2016, the restructuring of one large banking group accelerated this downward trend. This reduction was broad based, all major regions (with the exception of the U.K.) contributed to this development. However, the reduction was markedly lower in Central, Eastern and Southeastern Europe (CESEE) than in other regions. The regional distribution of exports

Chart 3

Gross exports of the financial sector



Source: OeNB.

highlights the significant role of CESEE.[18] As a group, CESEE took more than 29% of all exports of the financial sector in 2016. This share was consistently increasing over the last two decades. Among individual countries, Germany is the largest trading partner for financial goods and services, as is the case with other goods and services, accounting for almost 24% of all exports.

3 Role of the financial sector in the financing process

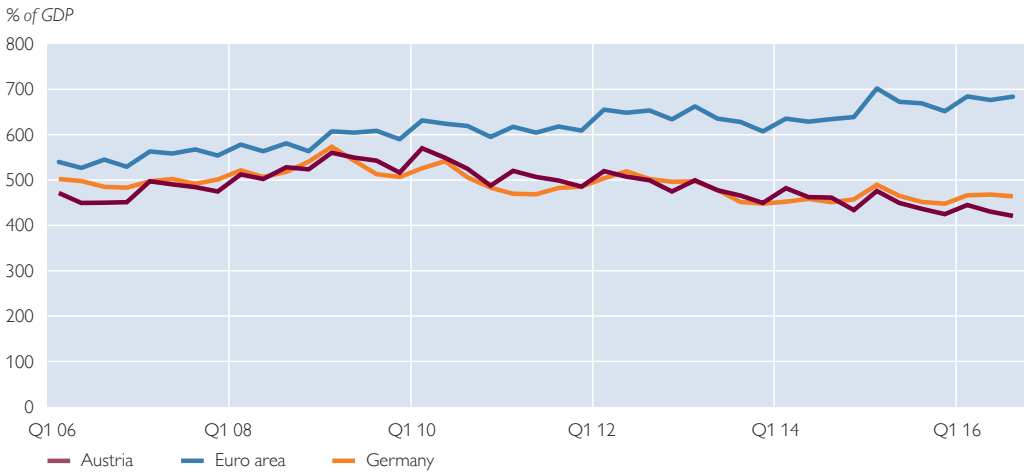
The second way to examine the macroeconomic relevance of the financial sector is to look at its intermediation function, i.e. its role in providing financial services to the real economy (enterprises, government and households). We base our analysis on the financial accounts, which provide harmonized data at a sectoral level. Within the financial accounts framework, the financial sector is represented by the institutional sector S12 (financial corporations) that covers all resident corporations whose main function is to provide financial services.

Looking at financial accounts data confirms the principal findings of the analysis of the financial sector's value added. To start with, the total financial volume (as measured by total assets) of the financial sector is not high in international comparison. By the third quarter of 2016, total assets of all Austrian financial corporations amounted to EUR 1.485 billion, which was equivalent to 430% of GDP. This was slightly

[18] *Using the classification of the Austrian balance of payments statistics, CESEE includes the following countries: Albania, Bosnia and Hercegovina, Bulgaria, Estonia, Kosovo, Croatia, Latvia, Lithuania, FYR Macedonia, Moldova, Montenegro, Poland, Romania, Russia, Serbia, Slovak Republic, Slovenia, Czech Republic, Ukraine, Hungary, Belarus.*

Chart 4

Assets of financial institutions



Source: ECB, OeNB.

below the German value (464%) and well below the euro area average of 684% of GDP (chart 4). Moreover, in contrast to the euro area as a whole, the ratio of financial corporations' total assets to GDP declined over the past years (in the first quarter of 2010, it had been 570%). Finally, financial accounts data reinforce the notion that the Austrian financial sector is strongly bank-based, although the share of banks in the total assets of all financial intermediaries has decreased since the onset of the crisis (fourth quarter of 2008) from 71.8% to 64.4%. In the euro area as a whole, banks contributed less than half (46.5%) to financial sector assets.[19] The difference between the euro area and Austria has widened substantially since the onset of the crisis.

From a macroeconomic perspective, a more relevant measure for the importance of the financial sector is the extent to which it finances the domestic real sector rather than devoting itself to other activities.[20] Until the onset of the crisis, financing nonfinancial corporations, government and households was becoming less relevant for the Austrian financial sector. Between 1995 and 2008 the share of funds provided to the domestic real sector (in the form of loans, debt securities and listed as well as unlisted shares) in total financial sector assets almost halved (from 50% to 25%) while foreign financings as well as financing within the financial sector increased. Since then, the share of the domestic real sector has recovered somewhat, reaching 30% in the third quarter of 2016. The largest contribution to this overall decrease came from the reduction in financing the public sector, whose share plummeted in the period from 1995 to 2008, but recovered to 6.3% in 2016 as the banking sector started to invest in government bonds (chart 5).[21] Financing non-

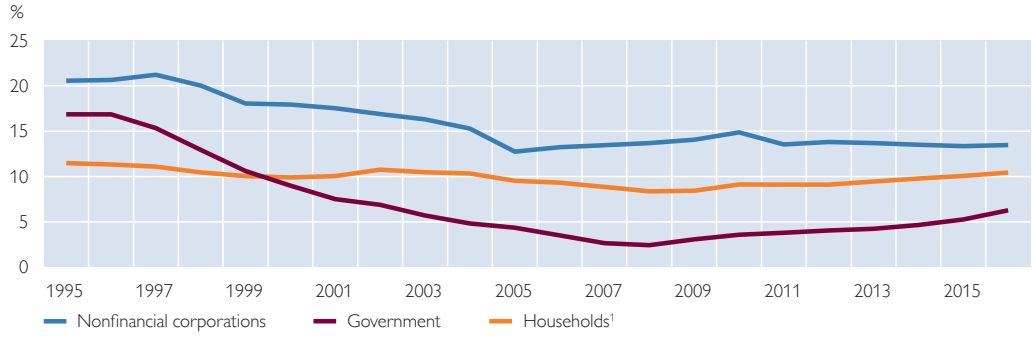
[19] *Again, the different role of captive financial institutions has to be taken into account (see footnote 10).*

[20] *By mid-2016, roughly 40% of the total financing volume of the Austrian financial sector were foreign financings. Unfortunately, the financial accounts do not allow for a breakdown of these by foreign economic sector. Furthermore, available data go back only to 2012. In this period, the share of foreign financings did not change much.*

[21] *Another factor that has played a role has been the reclassification of banks into the government sector in the form of bad banks.*

Chart 5

Share of real sectors in total assets of Austrian financial corporations



Source: OeNB.

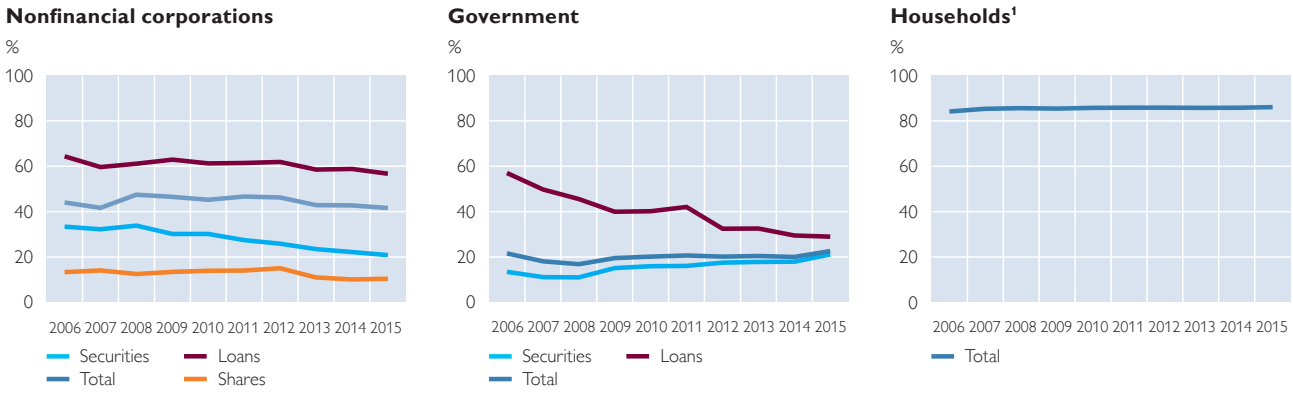
[1] Including nonprofit institutions serving households.

financial corporations also lost in importance until the onset of the crisis, whereas the share of households remained quite stable.

For the Austrian real sector, the domestic financial sector is still the main funding source, even if its share has diminished over the past decade (chart 6). The data for those financial liabilities for which a breakdown by creditor sector is available in the financial accounts show that Austrian financial institutions held 43% of the shares, securities and loans issued/incurred by the real sector in Austria. As data are available only from 2006, the pre-crisis development cannot be analyzed. Since then, however, the share of corporate bond holdings has fallen from one-third to one-fifth of the outstanding volume. The financial sector's holdings of nonquoted shares almost halved. The share of loans by financial institutions (mostly banks) in all loans to nonfinancial corporations shrank from 64% to 57%, reflecting an increase in intercompany loans. In government finance, financial institutions reduced their loans to government starkly, while they acquired additional government bonds so that their share in financing the Austrian government sector did not change

Chart 6

Share of the domestic financial sector in selected liabilities of the Austrian real sector



Source: OeNB.

[1] Including nonprofit institutions serving households.

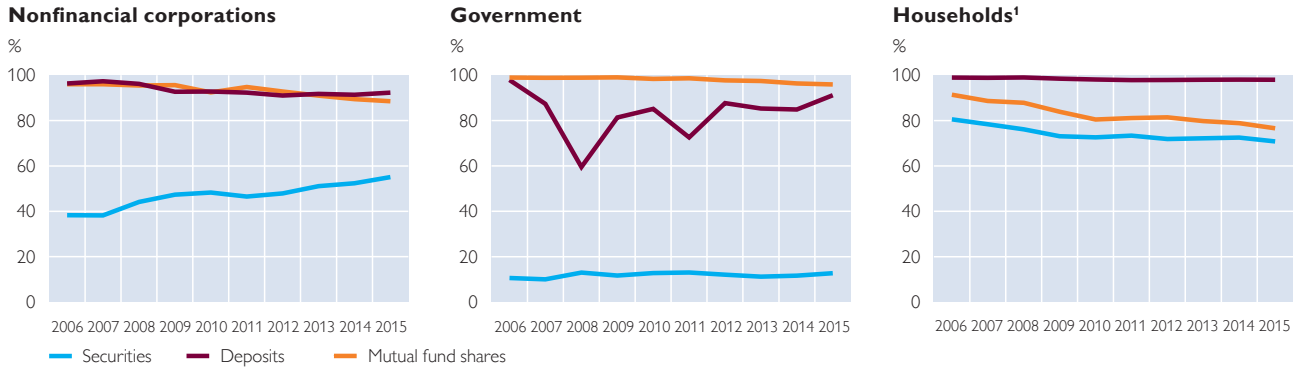
much overall, amounting to 23% in 2015. The share of the financial sector in the financing of households increased slightly, by 2 percentage points, to 86%.

On the asset side, the reduction in the importance of the Austrian financial sector for the real sector was somewhat more pronounced than on the liability side. The share of financial assets held by the real sector that is intermediated by the financial sector shrank steadily, from 50% to 42% between 2006 and 2015. The reduction in relevance was most marked for households. In particular, households withdrew capital from mutual funds issued by Austrian investment companies, but the Austrian financial sector' share in the direct holdings of securities and even in households' deposits also fell, the latter however only slightly (chart 7). Yet it has to be taken into account that domestic mutual funds invest to a considerable degree into foreign securities and shares.[22] Regarding nonfinancial corporations, the picture was similar for mutual funds and deposits while the share of securities issued by Austrian financial institutions even increased.[23] As to the government sector, the share of the domestic financial sector in deposits varied widely, reflecting strong fluctuations in deposits held with nonresident banks, especially immediately after the onset of the crisis in 2008.

Overall, the real sector now uses the intermediation services of the financial sector slightly less than in the past.[24] One might argue that increasing financial market integration and technological advances have rendered the

Chart 7

Share of the domestic financial sector in selected assets of the Austrian real sector



Source: OeNB.

[1] *Including nonprofit institutions serving households.*

[22] *By the end of 2016, more than two-thirds (69%) of the net asset value of all Austrian mutual funds were foreign investments.*

[23] *Stocks and bonds offer households the possibilities to invest their savings directly into companies, i.e. without intermediation by the financial sector (although the financial sector might supply other services regarding this investment). Data from the Household Finance and Consumption Survey (Fessler et al., 2016) show that about 10% of Austrian households invest in mutual funds, 4% in bonds and 5% in shares. Participation rates are the higher the higher the income or net wealth of households. For example, in the first net income quartile less than 1% of all households own shares compared to 13% in the fourth quartile. Furthermore, about 1% of all households in the first income quartile own bonds compared to about 8% in the fourth quartile. Analyzing participation rates according to net wealth gives a similar picture. Hence, this form of investment is more important for affluent households.*

[24] *This view only captures direct funding but neglects the provision of disintermediated financing, such as providing underwriting, consulting and advisory services, by financial institutions.*

geographical location of the providers of financial services increasingly irrelevant. Especially within the EU, the free flow of capital is one of the four freedoms of the single market, and this idea has fed into many EU initiatives and projects, ranging from the 1988 deregulation of capital movements in the EU to the Capital Markets Union project (Elsinger et al., 2016).

The (slight) reduction of the share of the Austrian financial sector in the financial assets and liabilities of the real sector would also corroborate this view. More than two-thirds of the liabilities of the Austrian government sector and almost one-third of the total external financing of the corporate sector came from abroad in 2015. However, there were marked differences across financial instruments. The cross-border share was lowest for bank loans, while more than two-thirds of Austrian corporate bonds were placed abroad, which may be ascribable to the relatively small domestic bond market. The same holds for the stock market. Moreover, the sizable foreign share in equity instruments and in other loans reflects the relatively high share of inward direct investment in the Austrian corporate sector (Elsinger et al., 2016).[25] Austrian households, in contrast, depend almost completely on domestic sources for their external financing.

4 Benefits of having a domestic financial sector

There are a number of reasons why geographic proximity between financial institutions and potential borrowers matters in the provision of financial services.[26] In essence, these reasons stem from information asymmetries that increase with distance. The role of proximity in the provision of financial services is most often attributed to transactions costs, which include transportation costs and information costs (Brevoort and Wolken, 2008). Transportation costs arise because screening loan applicants and monitoring existing borrowers may require regular site visits by a loan officer. Information costs are particularly relevant for evaluating credit applications from small, informationally "opaque" enterprises when lenders have to substitute "soft" information for "hard" information. Collecting this information strongly benefits from proximity to borrowers because it depends on personal contacts as well as the knowledge of the local community and economic conditions. These considerations are especially relevant for SMEs, which are more likely to be opaque and therefore require information to be updated more frequently. Since there are economies of scale associated with obtaining this kind of information, distance matters in financial relationships especially for SMEs. Both technological and financial innovations may have facilitated forms of transactions-based lending that focus on the quality of specific assets rather than on the overall quality of a firm. These assets can be valued using hard information and can therefore be used as collateral. As information on these assets may be obtained also for opaque small borrowers, there is less need for personal interactions between creditor and debtors (Udell, 2009). Nevertheless, in those cases in which hard infor-

[25] *Although the foreign share in equities may well include portfolio investments.*

[26] *Geographic proximity is not necessarily equal to being resident in the same country. Especially in a small open economy this may well mean being just across the border. However, if legal, linguistic and perhaps cultural differences are taken into account, then geographic proximity might in many cases at least be aligned with "domestic."*

mation cannot be replaced with soft information, relationship lending still requires the proximity of the borrower to the lender.

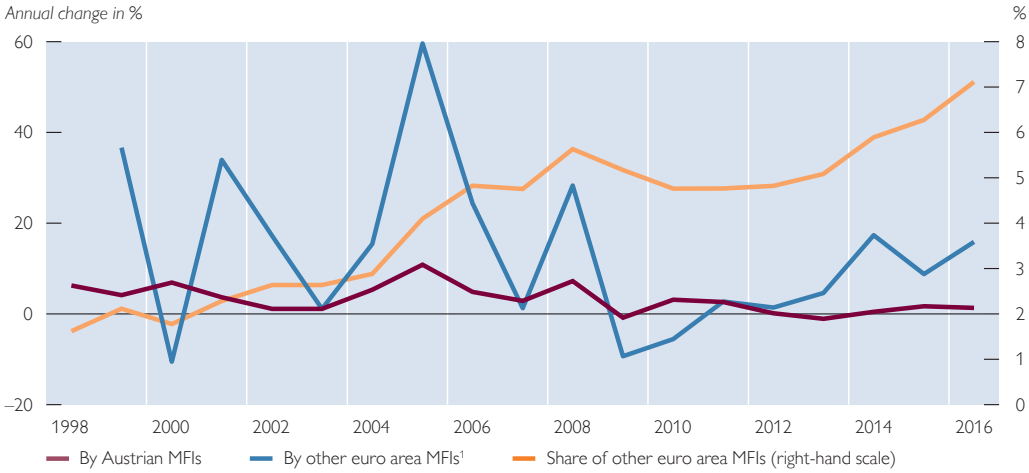
Furthermore, linguistic and cultural differences, different underlying economic structures, as well as differences in national supervision practices and corporate governance still pose barriers in the European credit markets (Affinito and Piazza, 2008). Again, these are likely to be felt more by smaller firms that tend to borrow smaller sums than larger companies do.

Informational and regulatory differences may also be behind the so-called "home bias" that (individual and institutional) investors exhibit in their investment decisions. Despite the full liberalization of capital movements and technological change, in virtually all portfolios the share of domestic assets is significantly greater than expected according to portfolio theory. At least partially, this tilt can be rationalized by various factors such as lower transaction costs, diverging tax rules, fewer information asymmetries or the absence of exchange-rate risk (Levy and Levy, 2014). As a result, the costs of diversification could be higher than the resulting return. Given the small size and the ensuing low liquidity of Austrian stocks, they would not be included in large international portfolios in the absence of sufficient liquidity. So Austrian corporations depend on domestic investors, including financial institutions, for their financing.

Furthermore, even within the euro area, financial integration is not a one-way street, as shown by the substantial financial fragmentation associated with the financial and sovereign debt crises between 2007 and 2011 (ECB, 2016). The crisis brought the era of rapid growth of cross-border capital flows to a halt and gave rise to an increasing re-nationalization of loan financing. Across types of flows, banking flows were hit the hardest, and the ensuing retrenchment of banking activity abroad was matched by an increase in domestic activity of banks. The share of

Chart 8

Loans to the Austrian non-MFI sector



Source: ECB.

[1] *Those euro area countries for which data are available since 1998.*

banks from other euro area countries in lending to Austrian nonbanks[27] showed a clear upward trend since the beginning of the European Monetary Union, even if it has been considerably more volatile than lending from Austrian banks, as chart 8 shows. One factor may have been that banks that were bailed out with public funds were expected to increase home-market lending (Milesi-Ferretti and Tille, 2011 and Lund et al., 2013). Thus, in times of financial stress, when information asymmetries become particularly relevant, financing from the domestic financial sector may be especially important.

5 Summary

In spite of the setbacks during the crisis years, the financial sector still accounts for about 4% of value added and about 3% of the labor force. However, estimating the contribution of the financial sector is hindered by uncertainties such as the treatment of risk in the financial sector's value added. For many years, the financial sector had also contributed to the Austrian current account surplus, although in recent years, its net exports diminished. The financial sector is closely intertwined with other economic sectors. A change in financial sector activities has a relatively strong impact on the Austrian economy. This holds particularly for legal, accounting, head office and consulting services. The true macroeconomic relevance of the financial sector goes beyond its direct contribution to output and demand. Its economic function lies in the financing of the real economy. However, also with respect to financial intermediation, the importance of the Austrian financial sector has been gradually decreasing. The reduction was most pronounced for capital market investments (mutual funds but also direct holdings of stocks and securities) of the household sector. For the financial sector, financing the domestic economy was becoming less relevant before the crisis hit, but has become somewhat more relevant again since then.

Even though the Austrian financial sector has shrunk over recent decades, the share of private credit in GDP is consistently higher than the threshold above which the literature suggests negative impacts on GDP growth. Furthermore, the relative increase of housing loans to households compared to loans to nonfinancial corporations that had been registered in many other countries took place in Austria, too, although on a far lesser scale. Thus, if the value-added share of the financial sector were to continue its decrease, this need not necessarily be a detriment to the Austrian economy. However, any specific conclusion would require a thorough analysis of the specific situation in Austria.

Recent technical advances as well as the increasing integration of financial and capital markets notwithstanding, there are still good reasons why the presence of a domestic financial sector matters in the provision of financial services. The considerations rest among others on the cost of screening loan applicants and monitoring borrowers. Furthermore, the financial and economic crisis triggered a re-nationalization of loan financing, which suggests that borrowing possibilities abroad are more fragile than domestic ones. These factors imply that despite the decrease of its relative importance there will still be a role for the domestic financial sector in the future.

[27] *Lending from all euro area banks (including those from Austria).*

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Annex

Table A1

Transfer table

NACE	Original	Combined
A01	Products of agriculture, hunting and related services	Agriculture and forestry
A02	Products of forestry, logging and related services	
A03	Fish and other fishing products; aquaculture products; support services to fishing	
B	Mining and quarrying	
C10—12	Food products, beverages and tobacco products	Manufacturing
C13—15	Textiles, wearing apparel and leather products	
C16	Wood and of products of wood and cork, except furniture; articles of straw and plaiting materials	
C17	Paper and paper products	
C18	Printing and recording services	
C19	Coke and refined petroleum products	
C20	Chemicals and chemical products	
C21	Basic pharmaceutical products and pharmaceutical preparations	
C22	Rubber and plastics products	
C23	Other non-metallic mineral products	
C24	Basic metals	
C25	Fabricated metal products, except machinery and equipment	
C26	Computer, electronic and optical products	
C27	Electrical equipment	
C28	Machinery and equipment (not elsewhere classified)	
C29	Motor vehicles, trailers and semi-trailers	
C30	Other transport equipment	
C31—32	Furniture; other manufactured goods	
C33	Repair and installation services of machinery and equipment	
D35	Electricity, gas, steam and air-conditioning	Utilities
E36	Natural water; water treatment and supply services	
E37—39	Sewerage; waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services	
F	Constructions and construction works	Construction
G45	Wholesale and retail trade and repair services of motor vehicles and motorcycles	Wholesale and retail trade
G46	Wholesale trade services, except of motor vehicles and motorcycles	
G47	Retail trade services, except of motor vehicles and motorcycles	
H49	Land transport services and transport services via pipelines	Transport
H50	Water transport services	
H51	Air transport services	
H52	Warehousing and support services for transportation	
H53	Postal and courier services	
I	Accommodation and food services	Accomodation and food
J58	Publishing services	Publishing, broadcasting, telecommunication
J59—60	Motion picture, video and television programme production services, sound recording and music publishing; programming and broadcasting services	
J61	Telecommunications services	
J62—63	Computer programming, consultancy and related services; information services	Computer programming
L68B	Real estate services excluding imputed rents	Real estate
L68A	Imputed rents of owner-occupied dwellings	
M69—70	Legal and accounting services; services of head offices; management consulting services	Legal, accounting, headoffice, consulting
M71	Architectural and engineering services; technical testing and analysis services	Scientific, enigineering and other services
M72	Scientific research and development services	
M74—75	Other professional, scientific and technical services; veterinary services	
M73	Advertising and market research services	Advertising and market research
N77	Rental and leasing services	Other
N78	Employment services	
N79	Travel agency, tour operator and other reservation services and related services	
N80—82	Security and investigation services; services to buildings and landscape; office administrative, office support and other business support services	Security, building services, business support
O84	Public administration and defence services; compulsory social security services	Education, health, social work, arts, sports
P85	Education services	
Q86	Human health services	
Q87—88	Social work services	
R90—92	Creative, arts and entertainment services; library, archive, museum and other cultural services; gambling and betting services	
R93	Sporting services and amusement and recreation services	
S94	Services furnished by membership organisations	Personal services
S95	Repair services of computers and personal and household goods	
S96	Other personal services	

Source: Authors' compilation.

Revised competitiveness indicators for Austria reflect a comparatively stable competitiveness development of the Austrian economy over the longer horizon

Walpurga Köhler-Töglhofer, Thomas Url, Ursula Glauninger[1]

The effect of price/cost competitiveness on national exports and imports, and hence on the current account, is especially important for open economies, in particular for small open economies. In Europe the issue of short-term price/cost competitiveness gained specific prominence after the onset of the global crisis in 2008, although large external imbalances had been identified even before 2008. Across the Eurosystem, various (harmonized) indicators are used to monitor and assess national short-term price/cost competitiveness performance. In Austria, these indicators are compiled by the OeNB in cooperation with WIFO, the Austrian Institute of Economic Research. National competitiveness indicators need to be revised regularly to ensure that they adequately reflect changing country-specific trade patterns, as the reliability of these indicators crucially depends on the weights of individual trading partners. In the current release for Austria, which reflects external trade data for the period from 2010 to 2012, the basic conceptual framework was left unchanged. A comparison of the country weights for six consecutive three-year periods, starting in 1995, that underly the current release highlights the re-orientation of trade flows towards countries that joined the EU in 2004 and 2007 as well as the rising importance of China as a destination for Austrian exports. The current revision of the competitiveness indicators for Austria, as described here, indicates only small variations in Austria's international competitiveness since 2008. Another purpose of this article is to establish which of the various price/cost competitiveness indicators best reflects our country's short-term price competitiveness. This is done by estimating standard export and import regressions and comparing the in-sample and out-of-sample fit of models that differ only with respect to the respective real effective exchange rate index. Performance indicators show that models including real effective exchange rates deflated by unit labor costs or by producer prices create comparatively smaller estimation and forecast errors than those using the HICP/CPI.

JEL classification: C43, F14, F31, F47
Keywords: price and cost competitiveness, effective exchange rates, manufacturing and service sector

The role of price competitiveness for exports and imports and therefore for the external balance of an economy has long been acknowledged in both theoretical and empirical studies of international trade. In Europe, the topic took on a new urgency after the outbreak of the global financial and economic crisis, since many euro area countries had experienced rising current account deficits, following their accession to monetary union, before the global crisis emerged. Improving price competitiveness, in particular in countries with substantial current account deficits, was seen as a crucial precondition for unwinding external imbalances accrued before the crisis and for ensuring sustainable growth in the euro area. Moreover, to prevent the buildup of unsustainable current account imbalances in the future, the EU developed a new alert mechanism for identifying and correcting macroeconomic imbalances at the national level, consisting of a scoreboard of macroeconomic indica-

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tors. Having been designed to pay particular attention to competitiveness developments, this framework contains, among others, five indicators measuring changes in external positions. One of these indicators, namely the real effective exchange rate, reflects the changes in the price competitiveness of each EU country. It is based on the insight that in the short run competitiveness basically burns down to the price competitiveness of the external sector, which is driven by relative price changes reflecting the development of labor and capital costs, productivity gains or losses, and exchange rate changes.[2]

Unlike other euro area countries, Austria had performed comparatively well in terms of short-term price/cost competitiveness before the global crisis hit.[3] Moreover, Austria had benefited from rising cross-border demand for goods and increasingly also for services following the accession to the EU/European Monetary Union. On the back of these developments Austria started to run consistent current account surpluses in 2002. Although the global crisis took its toll on the Austrian economy as well, the output setbacks were followed by a comparatively fast recovery in 2010 and 2011. However, as the recovery lost momentum in 2012 and Austria's economy grew by less than 1% per year on average from 2012 to 2015, the issue of competitiveness and of losing export market shares gained more prominence in Austria.

The usual approach to assessing a country's short-term (price and cost) competitiveness is to analyze how its bilateral exchange rates, domestic prices or cost indices have changed in relation to those of its trading partners. From a macro perspective it is the aggregate effect of all bilateral exchange rate changes that counts rather than individual changes of a parity, as individual changes may offset each other. Therefore the *nominal effective exchange rate index* of a currency (say the euro) – which is calculated as the weighted average of bilateral exchange rates – is a much more meaningful indicator for the economic impact of exchange rate changes on indicators of international trading activity. In order to arrive at a comprehensive indicator of competitiveness, movements in relative prices or costs between the home market and each external market have to be combined with the nominal effective exchange rate index. For this purpose, policymakers rely on *real effective exchange rate indices,* which adequately reflect country-specific trade patterns and build on meaningful and internationally comparable price and cost indices.

For the euro area as a whole, the ECB calculates real effective exchange rate indices of the euro as aggregate price/cost indicators. Thus, these indices by definition mask differences in the price/cost competitiveness of individual euro area countries.[4] Yet from a national perspective, such differences are, of course, a major yardstick for the trade performance of individual member countries. This is why individual euro area members continue to calculate and publish *national price/cost competitiveness indicators* (i.e. *national real effective exchange rate indices*). The euro

[2] *In sum, the EU scoreboard includes 14 main indicators. Violations of multiple thresholds would trigger an in-depth review by the European Commission.*

[3] *See Köhler-Töglhofer and Magerl (2013).*

[4] *See ECB (2000, 2003), Buldorini et al. (2002), and Schmitz et al. (2012) on calculating the nominal and real effective exchange rates for the euro.*

area members committed themselves in 1999 to use a harmonized methodology for this purpose and to revise their indicators at regular intervals to catch up with changes in trade patterns. The most recent revision took place in 2013. Now that a comparable external trade dataset has become available for the three-year period from 2010 to 2012, a new revision was possible.[5]

In Austria, these indicators are compiled by the OeNB in cooperation with the Austrian Institute of Economic Research (WIFO). While based on the harmonized methodology, the Austrian aggregate competitiveness indicator is much broader than the competitiveness indicators calculated by other international institutions since the Austrian indicator consists of four subindices: a subindex for manufactured goods, a subindex for food, a subindex for raw materials and energy products, and a subindex for services.

Regular revisions are meant to ensure that the indicators adequately reflect changing country-specific trade patterns, remain meaningful measures and continue to be internationally comparable. The current revision of the set of indicators shows that Austria's aggregate price competitiveness has improved – although not continually – from the onset of monetary union until 2012, with manufacturing exporters as well as service providers experiencing marked gains in price competitiveness. The aggregate cost competitiveness indicator confirms this picture. However, the strong competitiveness gains observed in the first years of monetary union were lost completely until mid-2013 and regained only partly in 2015 and 2016. Following the onset of the global crisis, in particular in the years 2012–2014, Austrian producers faced a comparatively challenging environment.

With regard to the various price and cost competitiveness indicators calculated by the OeNB in collaboration with WIFO, there is no agreement on which of these indicators better reflect our country's external price competitiveness, thus measuring its effects on foreign trade more appropriately. In the following, we estimate standard export and import regressions for quarterly data and compare the in-sample fit of models differing only with respect to the respective effective exchange rate index. We also compare the out-of-sample performance of these models by comparing recursive prediction errors at 1- to 4-step ahead forecast horizons. This comparison seeks to establish the relevance of alternative relative price or cost measures on Austria's foreign trade performance.

The following section reviews the main characteristics of the price/cost competitiveness indicators. Section 2 addresses the calculation of the country weights based on the trade relations prevailing in the period from 2010 to 2012. Section 3 provides a snapshot of the competitiveness development of the Austrian economy based on the updated price and cost competitiveness indicators with a specific focus on changes observed since the onset of the global crisis. Section 4 focuses on the question which of the various indicators are better reflections of Austria's short-term competitiveness.

[5] *Other institutions like the European Commission, the Bank for International Settlements or the International Monetary Fund also calculate national competitiveness indicators for individual countries, however, based on their own methodologies.*

1 Main characteristics of the competitiveness indicators for Austria remain unchanged

As mentioned above, the euro area countries committed themselves in 1999 to use a harmonized methodology for calculating their national competitiveness indicators and to revise the indicators at regular intervals. Hence past releases of the competitiveness indicator for Austria have been consistent with the harmonized Eurosystem methodology. Now that a comparable external trade dataset has become available for the three-year period from 2010 to 2012, a new revision was possible. In this new revision the basic conceptual framework was left unchanged and the typical building blocks as well as all the innovations implemented in the previous revision of 2013 have been retained (Köhler-Töglhofer and Magerl, 2013 and Hahn et al., 2001). The *main characteristics* of the harmonized competitiveness indicators compiled by the OeNB and WIFO are as follows:

- The aggregate index consists of four subindices calculated for manufactured goods, food, raw materials/energy products and services.
- The index is based on geometric weighting, i.e. it represents the weighted geometric average of a basket of bilateral exchange rates, which yields the price or cost competitiveness indicator when adjusted for the respective relative price or cost indices.
- The individual country weights in the *subindex for manufactured goods* continue to be calculated on the basis of *single (bilateral) import and double (multilateral) export weights*. While direct (or bilateral) export weights are easy to calculate and intuitive, they neglect third-market effects. The method of choice to catch third-market effects are "double export weights," as they are more comprehensive: They reflect both home and external market competition with individual competitors (depicted in competition matrices; see table A2 in the annex). The drawback of double export weights is that they are more difficult to calculate[6] and less intuitive.
- The *index base period* has been left unchanged at the first-quarter average (arithmetic mean) of 1999 (i.e. Q1 99 = 100), which is the base period established by the harmonized Eurosystem framework.
- The revision of 2013 introduced *chain-linking,* replacing fixed weights[7] with a series of weights for consecu-

[6] *Double export weights are calculated on the basis of complex competition matrices. These matrices also track any goods sold on the domestic market that were manufactured domestically and thus compete with imports from other countries. While the ECB takes net manufacturing output (gross manufacturing output less intermediate consumption by manufacturers) as the starting point for building the competition matrix for manufactured goods, the OeNB and WIFO use gross manufacturing output. The rationale behind this approach is that the OeNB considers only gross manufacturing output to be consistent with the foreign trade statistics derived from gross flows. Moreover, intermediate goods and services do affect competitiveness. All other calculation steps are the same for both indicators. Given that gross manufacturing output exceeds net manufacturing output, the OeNB/WIFO indicator yields a higher share of domestic producers in a given market than the ECB indicator. See box 1 in Köhler-Töglhofer et al. (2006).*

[7] *The underlying country weights were fixed over the entire calculation period, starting from 1999, with revised trade weights established during successive rounds of revision (three-year averages for external trade shares). However, in some respects, the price competitiveness index was a chain-linked index even before the revision of 2013, as the index for the period up to 1999 remained based on the sample of trading partners and competing countries underlying the revision of 2001, using weights from the 1995–1997 period. This procedure was chosen because it ensured a more adequate reflection of Austria's trade relations, and thus of its competitiveness situation in the 1993–1998 period.*

tive three-year periods. With the 2016 revision, country weights are now available for six consecutive three-year periods, namely for 1995–1997, 1998–2000, 2001–2003, 2004–2006, 2007–2009 and 2010–2012. The effective exchange rate indices are obtained by chainlinking the indicators based on each of these six sets of trade weights at the end of each three-year period. Looking ahead, the country weights relating to the most recent period (2010–2012) will be used to evaluate price and cost competitiveness until the next full three-year dataset (2013–2015) becomes available.

– We use *three deflators* to calculate the Austrian competitiveness indicators, namely the *HICP/CPI, producer prices, and total unit labor costs (ULC) of the economy*. Specifically, the subindex for the manufacturing sector is calculated on the basis of the HICP/CPI as well as producer prices.[8] The subindex for the service sector and the index for the competitiveness of the Austrian producers and service providers are based on the HICP/CPI as well as on total unit labor costs of the economy.[9] The subindices for food and for raw materials/energy are derived solely on the basis of the HICP/CPI.
– The choice of three different deflators is motivated by their underlying merits and drawbacks: The HICP/CPI deflator is the most widely used variable for calculating real effective exchange rate indices and national competitiveness indicators, given the *timely availability* and the *international comparability* of data. Yet the goods baskets underlying consumer price indices include large numbers of nontradable goods, which makes them an imperfect proxy for changes in tradable goods prices. Hence the rationale for also using producer prices, which have the advantage of being focused more strongly on tradable goods – subject to the disadvantage that internationally comparable producer prices are not available for all relevant trading partners of Austria, but only for 26 competing countries. Total unit labor costs, finally, are the deflator of choice for calculating an indicator of cost competitiveness. This deflator relates to the *economy as a whole*[10], which is a crucial drawback insofar as total unit labor costs also reflect the development of wages and productivity in the nontradable sector of production.[11] Moreover, internationally comparable total unit labor costs are also not available for all relevant trading partners of Austria, limit-

[8] *Until 2013 unit labor costs of the manufacturing sector were used as the deflator since they are a key determinant of manufactured goods sales prices and thus a key indicator of the short-term competitiveness of an economy. However, retaining this cost competitiveness indicator was not on option, as the data on unit labor costs of the manufacturing sector were derived from the OECD, which stopped updating the calculation of comparable unit labor costs for the manufacturing sector in 2012.*

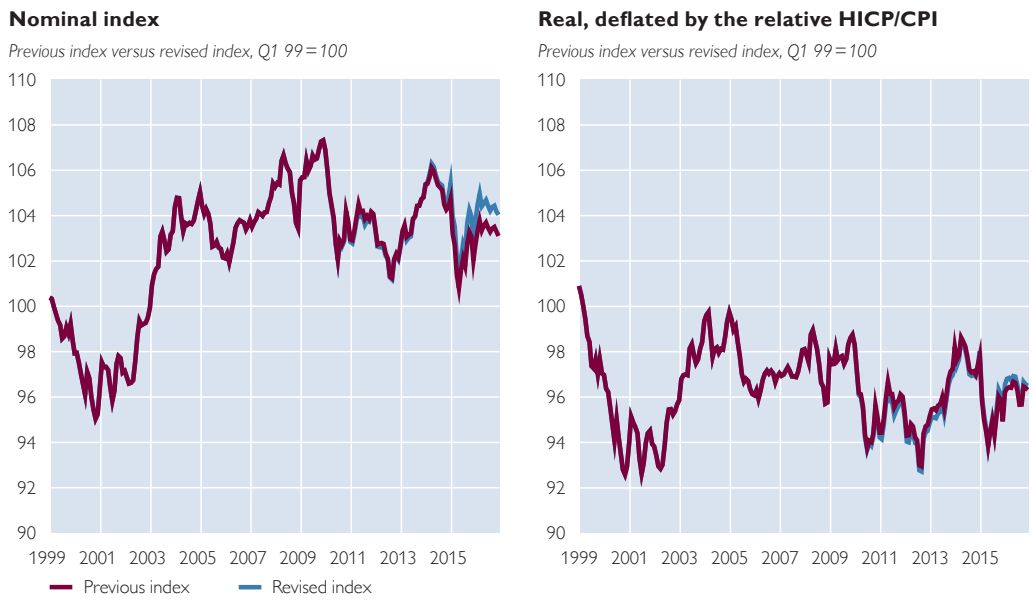
[9] *Unit labor costs for the whole economy are defined as compensation per employee divided by real gross domestic product per employed person.*

[10] *If we assume that labor costs for nontradable goods and personal services rise faster than labor costs in the tradable sector, cost competitiveness indicators based on this deflator must be subject to a certain bias. However, if these nontradables are used as inputs in the tradable sector they exert a significant influence on price competitiveness.*

[11] *For a thorough discussion of the merits and demerits of each deflator, see Köhler-Töglhofer (1999).*

Chart 1

Chained aggregate index of Austria's price competitiveness since 1999



Source: OeNB, WIFO.

ing the respective calculation to just 31 competing countries.[12]

– The regular revisions of the harmonized competitiveness indicators generally provide room for any necessary adjustment in the *sample of trading and competing countries*. The *sample of trading and competing countries* should reflect the patterns of a country's exports. Since the current sample of trading and competing countries still reflects Austrian exports adequately, it remains unchanged, i.e. the index is still based on a sample of 56 countries. As mentioned above, the country sample for the PPI-deflated index and for the ULC-deflated indices due to data restrictions are based on smaller country samples.

2 Country weights – comparatively stable ranking of Austria's trading partners

The assessment of the changes in the country weights – not only for the three-year period under scrutiny but also during the last decade and a half or so – shows that the "ranking" of Austria's main trading partners has in essence remained unchanged, as nearly 75% of the Austrian exports and imports continued to be exchanged with other European countries; at the same time, there have been changes in the *relative* importance of individual trading partners, such as China in particular, whose share in Austria's trade has been rising sharply.

Based on the weighting for the 2010–2012 period, the *aggregate index*

[12] *France, Belgium, Luxembourg, the Netherlands, Germany, Italy, Ireland, Portugal, Spain, Finland, Greece, the Czech Republic, Denmark, Estonia, Hungary, Latvia, Lithuania, Poland, Sweden, Slovenia, Slovakia, the United Kingdom, Australia, Canada, Japan, Norway, Switzerland, the U.S.A., South Korea, New Zealand and Israel. These 31 countries, however, account for more than 80% of domestic foreign trade in goods and services.*

(export- and import-weighted across all subindices) continues to be characterized by a high foreign trade share of the countries that joined the EU before 2004 (57%), which is less than during the period 2007–2009 (60%), whereas the countries that acceded the EU in 2004 and 2007 now account for a share of 13.4% (increase by 0.7 percentage points compared to the previous period).[13] Germany continues to be the country with the largest country weight (33.1%), followed by Italy (7.2%) and the U.S.A. (7.1%).[14] China's trade weight of 4.7% (slightly above the previous period's value of 3.8%) is now even higher than that of France (3.7%) and Switzerland (4.1%). The Czech Republic (3.3%) gained in relative importance, outperforming the Netherlands (2.9%) and the U.K. (2.6%). The Russian Federation's weight comes to 2.5%. The high weight of the U.S.A. – i.e. of the U.S. dollar – results above all from the raw materials and energy products subindex, as imports in this category are mostly denominated in U.S. dollars (see table A1 in the annex).

As outlined above, the export weights for the *manufacturing goods subindex* are calculated as *double export weights* reflecting third-market effects. An analysis of both double export weights and single export weights across the three-year periods produces some interesting insights: Germany's double export weight has shrunk significantly over time (from nearly 30% in 1998–2000 to 24% in 2010–2012). Similarly, the weights of Italy, France, the U.K., Japan and the U.S.A. have gone down during the periods covered by the indicators. In addition, the weight of Switzerland has dropped markedly since the latter part of the 1990s. At the same time the weights of some of the countries that joined the EU in 2004 or 2007 (such as the Czech Republic, Poland or Slovakia) have increased markedly. Overall, China stands out as the country whose relevance for Austrian manufacturing exporters reflects the largest increases (from 1.7% to 7.8%) since the period 1998–2000 (see table A3 in the annex). Its weight is now 1 percentage point higher than that of the U.S.A. China has also become to be more important for domestic manufacturing exporters than Italy, which is after all Austria's second-largest export trading partner within the EU.

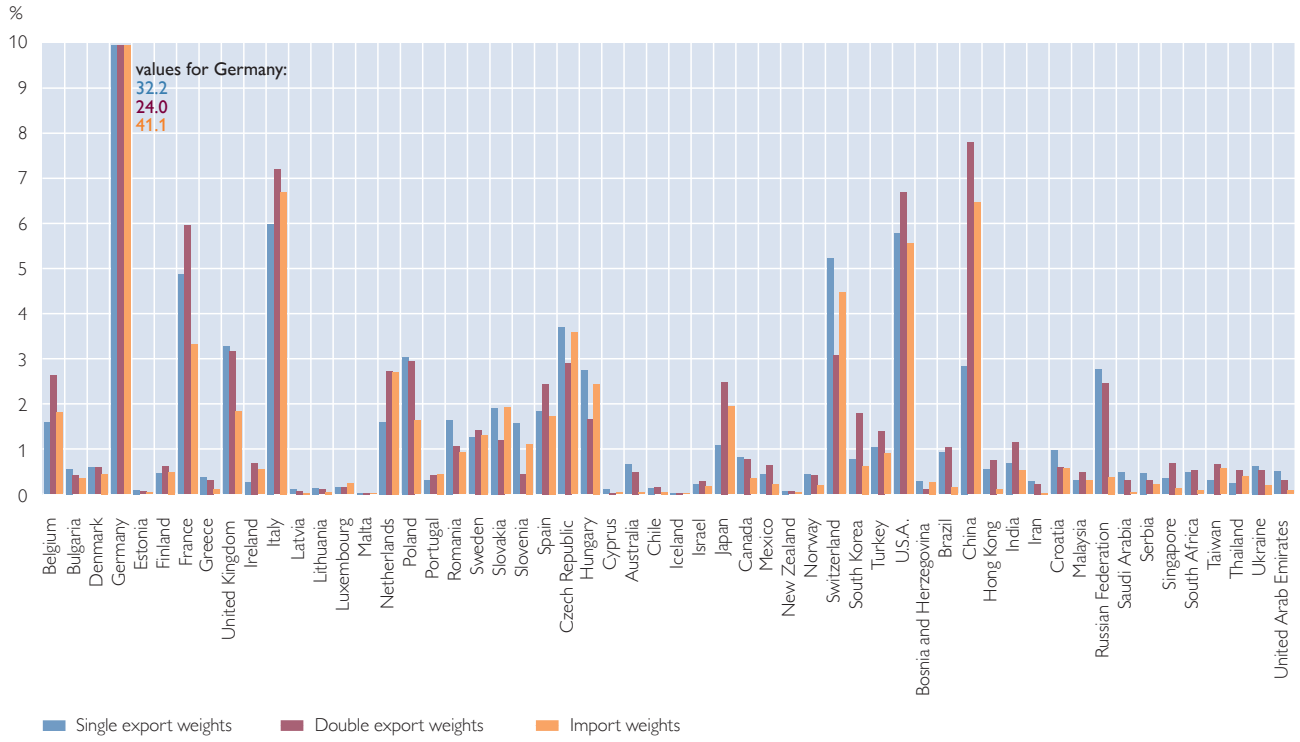
With regard to the impact of foreign competition on domestic industries in third markets, a cross-check of single and double export weights highlights that Austria's single most important trading partner, Germany, continues to show a direct export weight heavily exceeding the export weight that includes competition for domestic exporters in third markets. The same holds true for Switzerland, Belgium and many of the countries that joined the EU in 2004 and later as well as for the Russian Federation (chart 2). The reverse holds for China, Japan, Italy, the Netherlands, the U.S.A., Turkey and most of the Asian emerging markets (e.g. South Korea, India, Hong Kong, Singapore or Taiwan). The latter group of countries and their staple exports constitute ever stronger competition for domestic exporters in third markets. This holds in particular for China, for which the double export weight is 2.7 times its direct weight. Conversely, countries whose double export weight is below their direct export weight are less of a competition

[13] *At the end of the 1990s, the foreign trade share of this country group was only 7%.*

[14] *In the period of 2007–2009, Italy's weight was 7.6% and that of the U.S.A. 9.2%.*

Chart 2

Single and double export weights in the manufactured goods subindex from 2010 to 2012



Source: OeNB, WIFO.

for domestic exporters in third markets. This may be because they are targeting different regions with their exports, or because they export different goods and services.

In the evaluation of the short-term price competitiveness of Austrian manufactured goods exporters, the EU-27 aggregate now accounts for a share of 63.2%. Thus, other EU Member States continue to account for the lion's share of domestic manufacturing exports. At the same time, this share has been going down (in the last decade and a half it shrank by about 10 percentage points). The weight of the euro area (49%) has also been decreasing. While exchange rate uncertainty has disappeared within the euro area, the measure of 49% must not be misinterpreted as the share of Austrian manufactured goods exports that is no longer exposed to exchange rate risks. Competition in non-euro area markets, as reflected by double export weights, causes bilateral exchange rate changes of the euro to other currencies to continue to exert an – indirect – influence on Austrian exports. Of course, the same holds true for Austria's competitors from other euro area countries.[15] In addition, the competitiveness of domestic exporters relative to those in other euro area countries still depends on relative changes in cost and price levels. The aggregate share of those EU Member

[15] *To give an example, the double export weights account for the competition between Austrian and German exports both in the German market and in all other euro area and non-euro area markets. In the case of the latter, exchange rate changes of the euro to the respective national currency matter for Austrian and German exporters alike.*

States that have not yet joined the euro area (14.1%) has decreased slightly over time.[16]

Compared with exports of manufacturing goods, domestic *services exports* continue to be more focused on EU markets (75%). The euro area's share increased by more than 1 percentage point to 61% with the latest update. Again, Germany is Austria's single most important trading partner (with a share of 40% against 38% in the previous period), followed by Italy (5.5%, almost unchanged), the Netherlands (4.2%) and the U.K. (3.6%). The shares of the U.S.A. and Switzerland are 7.5% and 6.9%, respectively.[17]

In the *subindices for raw materials and energy, food and services,* the U.S.A. stand out. Its share appears to be astonishingly high at first glance. This accounts for the fact that additional to Austria's exports to and imports from the U.S.A., corresponding trade flows to and from countries not specified in the index[18] are also invoiced in U.S. dollars, thus adding to the weight of the U.S. dollar.

3 Price competitiveness after the global crisis 2008

3.1 The "post-crisis period" – challenging times for Austrian manufacturing exporters

Between January 1999, when the European monetary union was established, and November 2016, *domestic manufacturing exporters* improved their price competitiveness by more than 5% in real terms, judging from the export-weighted competitiveness index *deflated by the HICP/CPI*. When also taking into account the underlying nominal effective appreciation by nearly 5%, the relative improvement that is attributable solely to changes in price patterns was close to 10%. A cross-check with the competitiveness indicator based on *the producer price index* confirms this trend over the long term. In real terms this indicator dropped by 6% in the period from the first quarter of 1999 up to the third quarter of 2016; the underlying nominal effective depreciation contributed 1 percentage point to the improvement of the PPI-based indicator. The difference in the nominal effective exchange rate developments is due to deviating country samples used for computing each weighting matrix.

As the Austrian economy was characterised by a protracted period of low GDP growth and – by historical standards – weak export growth between 2012 and 2015, a closer inspection of the more recent changes in price competitiveness is required. Indeed, we find the two indicators to have diverged after the onset of the global crisis in 2008, between autumn 2008 and November 2016. Assessed on the basis of the HICP/CPI-deflated indicator, the price competitiveness of the Austrian manufacturing sector improved slightly by about 2%, fluctuating, however, within a band between 92 and 99 (with Q1 99 = 100). This development was, more or less, determined by exchange rate variations. Yet according to

[16] *However, this aggregate figure masks a comparatively strong decline in the share of the U.K. and a rising importance of Poland, the Czech Republic and Romania for Austrian manufacturing exports. In addition, the weight of Switzerland has dropped markedly since the later part of the 1990s, and so have the shares of the U.S.A. and Japan. Conversely, China has gained tremendous importance for domestic manufacturing exporters over the past 1 ½ decade.*

[17] *A comparison over the whole range of periods is not possible since the service subindex was newly implemented in the previous revision of 2013.*

[18] *Rest of the world.*

the PPI-deflated index, calculated for just 26 competing countries, Austria's competitive performance worsened by ½% over this period, with the nominal effective exchange rate depreciating by 1¾%. This implies that the producer prices of Austrian manufacturing exporters rose comparatively stronger than those of their foreign competitors (chart 3A, left panel).

Given the large current account imbalances accumulated by some euro members up to 2008, a regional decomposition of changes in price competitiveness reveals a few quite diverging patterns for the period after 2008 (chart 3A, right panel). Domestic manufacturing exporters made no headway in becoming more competitive in intra-euro area trade. With respect to the euro area they exhibited a marked loss of about 4¾% since mid-2008. Moreover, against those EU Member States which have not yet introduced the euro, Austria experienced even more substantial losses in price competitiveness, of more than 10%. This unfavorable development was partly offset by price competitiveness gains of nearly 30% against U.S. producers. This improvement was, however, completely due to the depreciation of the euro against the U.S. dollar, which also amounted to about 30% since mid-2008. The competitiveness gains vis-à-vis Japan of about 20% also go hand in hand with a depreciation of the euro against the Japanese yen by about 30%.

3.2 Loss of cost competitiveness following the onset of the global crisis

The (import- and export-weighted) index measuring the *cost competitiveness of Austrian producers and service providers* uses *total unit labor costs as the deflator* instead of prices. This indicator shows that competitiveness has improved by about 1% since the launch of the euro, with the entire gain being attributable to nominal effective exchange rate developments. Specifically, this indicator shows an initial improvement of about 7%[19] in Austrian exporters' competitiveness in the first two years of monetary union. While nearly all of this competitiveness gain was gone by mid-2009, the subsequent quarters show another slight competitiveness gain until mid-2012, another reversal until the end of 2014, and a renewed marginal improvement since then. However, the slight worsening of Austria's cost competitiveness from the outbreak of the crisis up to mid-2016 (1%) was driven completely by unit labor costs, which developed less favorably in Austria than abroad. This becomes obvious when taking into account the nominal effective depreciation of about 3% since the third quarter of 2008.[20]

When we compare the cost-based index with the *HICP/CPI-deflated price competitiveness indicator*, the results do not match (chart 3B, left panel). The HICP/CPI-deflated indicator signals an improvement in competitiveness by almost 4% in the long run since the start of European monetary union. This improvement resulted from gains in relative prices of about 8% partially corrected by a nominal effective appreciation. Over the period since the onset of the crisis to mid-2016 the price competitiveness of Austrian producers and service providers improved slightly by about 2%, driven by the nominal exchange rate.

[19] *More than one-third of this improvement was exchange rate-related.*

[20] *Yet, this indicator may very well underestimate the competitiveness of Austrian manufacturers, as total unit labor costs are largely determined by nontradable, low-productivity services.*

3.3 Domestic service providers retained their price competitiveness after the onset of the crisis

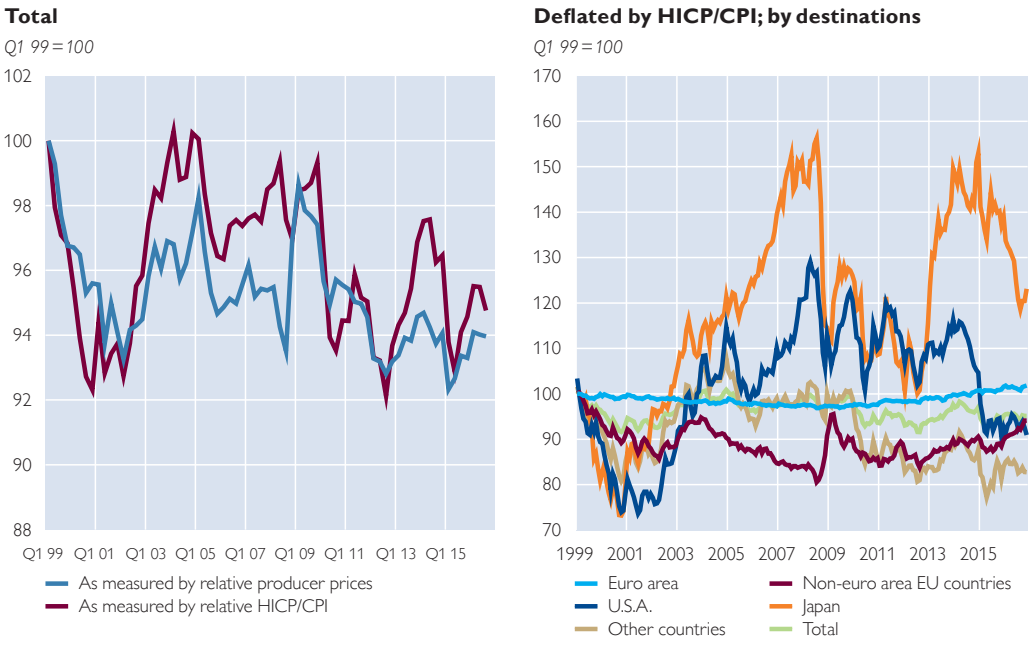
When we look at the (export- and import-weighted) indices designed to reflect the *cost competitiveness of service providers* on the basis of *total unit labor costs*[21] we find competitiveness gains of about 3% since the launch of the euro, half of which stem from a nominal depreciation. The period up to 2008 was characterized by a strong improvement over the first couple of years that was to a large extent compensated in the following years until the onset of the crisis. After the crisis, the services index fluctuated within a narrow range around a mean of 97.

The gains in the period before the crisis hit were partly compensated by a nominal appreciation. In the period after the onset of the crisis we see a diverging pattern featuring a nominal effective depreciation of about 3% which corrected the more than proportional increase of unit labor costs in Austria and resulted in a stable competitive situation.

Over the full sample period, this compares with a real depreciation of more than 3.5% reflecting the relative changes of consumer prices. This overall picture can be decomposed into the pure exchange rate movement, which resulted in an appreciation by 4.8%, and the development in relative prices. Smaller inflation rates in Austria – relative to its competitors – more than compensated for the uptick in nominal exchange rates. Looking only at the development since the onset of the crisis reveals that Austrian service providers, based on the service indicator deflated by the HICP/CPI, faced a worsening of their price competitiveness by more than 2%, half of which was due to the nominal appreciation.

Chart 3A

Export-weighted real effective exchange rate indices for manufactured goods

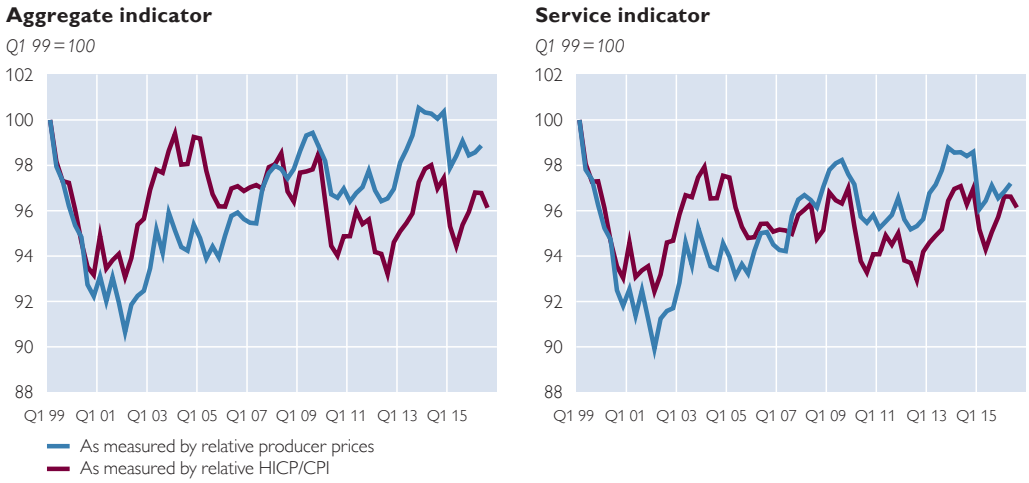


Source: OeNB, WIFO.

[21] *This indicator is based on 31 competing countries.*

Chart 3B

Import- and export-weighted real effective exchange rate indices



Source: OeNB, WIFO.

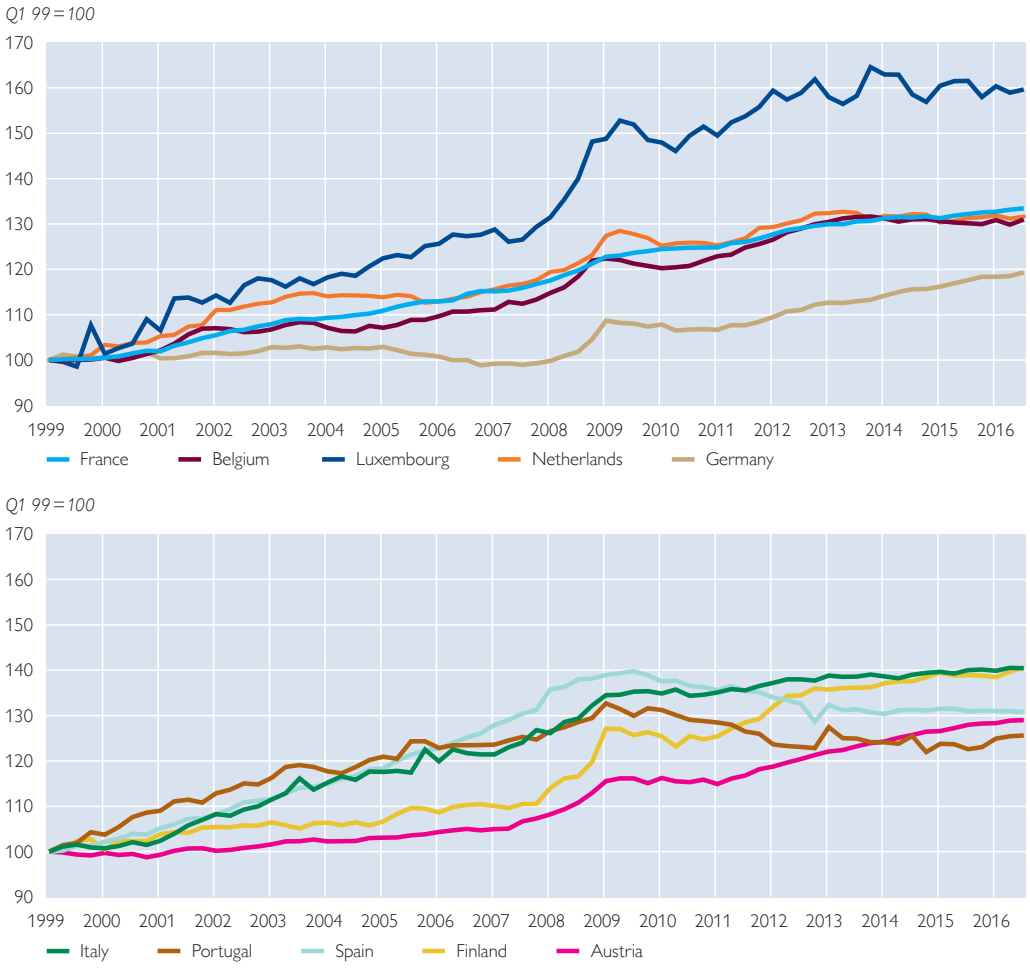
The long-term patterns imply that the gains in competitiveness made by domestic service providers between early 1999 and 2016 amount to roughly 3% both in terms of relative consumer prices and in terms of total unit labor costs. At the same time, the matching headline figures mask highly divergent underlying nominal effective exchange rate movements that result from the fact that the two indicators are based on different country samples and hence on different country weights (chart 3B, right panel).

3.4 Changes in total unit labor costs in Austria relative to changes in other euro area countries

Unit labor costs in the Austrian economy as a whole remained broadly stable from early 1999 until late 2004, thus developing in conformity with total unit labor costs in Germany. The story is different, to some extent, for the period from late 2004 until the third quarter of 2008 when the global economic crisis emerged. In this period, total unit labor costs rose gradually by about 8%, which was still moderate compared with other trading partners (the exception to this observation being Germany, because German unit labor costs decreased by less than 1% in this period). From the third quarter of 2008 until the third quarter of 2016, Austria faced a substantial increase of unit labor costs (16%), which was however more or less on a par with the development of total unit labor costs in Germany (17%). Other euro area countries like France, Belgium, Luxembourg, Netherlands and Italy exhibited more moderate increases, whereas Portugal (–2%) and Spain (–5%) even saw decreasing total unit labor costs. Finland, in comparison, experienced a marked increase of nearly 21%. For the Austrian as well as the German case, the increase can be explained by comparatively higher wage increases agreed between the social partners as well as by productivity losses resulting from the fact that the decline in economic output in 2009 above all led to a reduction in hours worked – partly subsidized – rather than massive layoffs. Those European countries which had built up comparatively high macroeco-

Chart 4

International comparison of total unit labor costs in euro



Source: OeNB, WIFO.

nomic imbalances and/or unsustainable current account deficits were forced to take measures to significantly improve their unit labor cost positions after 2009.

When we look at the period from early 1999 until the third quarter of 2016, total unit labor costs rose by 29% in Austria – compared with 19% for Germany, 40% for Italy, 41% for Finland, some 33% for France and the Netherlands, and 31% for Belgium. Those countries that were hit particularly hard by the global crisis plus, in some countries, the bursting of a real estate bubble – namely Ireland, Spain, Portugal – have seen their unit labor costs rise by between 5% and 30% since 1999.

4 Applying the new effective exchange rate indices in empirical models for foreign trade flows

In this section, we estimate and evaluate empirical models for trade flows based on the newly calculated competitiveness indicators. For the comparison of different models we use their in-sample fit and their predictive power in terms of *h*-step ahead forecast errors. In general, forecasters of international trade flows are interested in two dis-

tinct foreign trade statistics. The first is national accounts data where forecasters concentrate on exports and imports measured at constant prices. The national accounts system includes total exports and two subaggregates: goods and services exports. These categories are also available for imports and allow for an assessment of real effective exchange rate indices.

Alternatively, forecasters may be interested in the future current account balance of a country. In this case, they will concentrate on current account data measured at current prices, which are available on a more disaggregate level. The current account system provides disaggregated data on trade in goods, general merchandise, services, tourism in the broad sense[22] and in the narrow sense, and personal transport. We therefore repeat our evaluation for current account data but use the nominal effective exchange rate indices instead.

The forecasting models are based on the classic design for empirical aggregate foreign trade regressions proposed by Goldstein and Khan (1985). We modify this relation only by analyzing a combination of equations in levels and in first differences to account for possible stochastic trends in the data. In general, the level equation representing the long-run relation between a trade flow and the explanatory variables is:

$$\log(trade_t) = \beta_0 + \beta_1 \log(demand_t) + \\ + \beta_2 \log(competitiveness_t) + u_t$$

where $trade_t$ represents either import or export flows as listed in table A4 in the annex. The associated $demand_t$ is either the Austrian gross domestic product in the case of imports or world output in the case of exports. Quarterly data for world output have been constructed from annual values using the AR(1) maximum likelihood interpolation based on the OECD output series as the quarterly indicator (Chow and Lin, 1971). The effective exchange rate indices indicate changes in the international price $competitiveness_t$ of Austrian goods and services. We use all newly calculated import- and export-weighted effective exchange rate indices as listed in table A4 and re-estimate each equation by replacing the respective indicator for competitiveness. With all variables transformed into logarithms, the parameters of interest are long-run elasticities of trade flows with respect to changes in demand and competitiveness, respectively. Both are given by the coefficients β_1 and β_2. The coefficient β_0 is the regression constant and has no economic interpretation.

This regression gives the long-run relation between the trade flow variable and the associated indicators for demand as well as price competitiveness. The error term u_t can be interpreted as a co-integrating error term, i.e. a deviation from the long-run equilibrium which will push the system back towards the long-run equilibrium position when included into the dynamic equation for growth rates (Engle and Granger, 1987). We test the co-integrating relation between trade flows, demand indicators and price competitiveness using the classic augmented Dickey-Fuller test with automatic lag selection based on the Schwarz criterion. We can reject a unit root in the residual of the co-integrating regression in all but two cases at the 1% significance level; for imports and exports of services at constant prices from the national accounts data we can reject a unit root at the 2% level.

[22] *Tourism including personal transport.*

The dynamic regression equation for seasonally adjusted quarterly data is:

$$\begin{aligned}&\mathrm{dlog}(trade_t) = \alpha_0 + \alpha_1 \mathrm{dlog}(demand_t) + \\ &+\sum_{i=0}^{8} \left((\alpha_{i+2} \mathrm{dlog}(competitiveness_{t-1})\right) + \\ &+\alpha_{11} u_{t-1} + , \alpha_{12} D_t^{EMU} + \alpha_{13} D_t^{MOEL} + \varepsilon_t\end{aligned}$$

where we approximate growth rates over the previous quarter by taking the first difference of the variables in logarithms (dlog). The parameters of interest are the coefficients α_1 and α_2 through α_{10}, now giving the short-run elasticities of trade flows with respect to indicators of demand and competitiveness. We allow for contemporaneous and eight lagged responses of trade flows to changes in the exchange rate indicator. Such a lagged response could emerge if the trade variables' responses to shocks in competitiveness follow the well-known J-curve shape (Rose and Yellen, 1987 and Bahmani-Oskooee and Brooks, 1999). In general, due to dynamic adjustment processes, models estimated at quarterly frequency are likely to have coefficients at higher lags which are still significantly different from zero. We therefore set the lag length uniformly to eight quarters. At the annual frequency this corresponds to models with a contemporaneous term and two lags.

The short-run equation also includes the lagged error correction term from the level equation with α_{11} showing the speed of adjustment to deviations from equilibrium. A negative value of α_{11} close to –1 indicates an extremely fast adjustment process, whereas a negative value close to zero would imply very slow convergence to the new long-run equilibrium relation. On the other hand, positive values imply an explosive process and we eliminate the results of these models from the following presentations. We also include two dummy variables jumping from zero to one in 1999, when the euro area was established, D_t^{EMU}, and in 2004, to reflect the EU's eastern enlargement in that year, D_t^{MOEL}. Finally, the dynamic equation includes an i. i. d. distributed residual, ε_t, with expected value of zero and constant variance.

4.1 The data

The national accounts data on trade flows are available at annual and quarterly frequencies. The annual data series spans as far back as 1954, but in this study we will present only the results based on quarterly data from the first quarter of 1996 through the first quarter of 2016 – the reason for this restriction being the limited range available for effective exchange rate indices based on unit labor costs, which start in 1996. Using the first quarter of 1996 as the starting point, we have fully comparable results for all effective exchange rate indices. Furthermore, models based on quarterly data are more popular among forecasters due to their timely perspective on the most recently published data. The results based on models using world output deviate somehow from models using OECD output, because the catch-up process of emerging markets lifts the average growth rate of world output at constant prices to +3.6% per year (1970 to 2015) compared to +2.6% for industrial countries (OECD). The different dynamics of world output growth not only affect the average growth rate but also change the covariance structure between the demand indicator and the effective exchange rate indices and consequently the estimates for the price elasticity.

The trade flow variables are not perfectly related. Table A5 in the annex shows the correlation coefficients for all export variables from the national

and the current account data. Whereas various definitions of goods exports are almost perfectly correlated, their respective correlations with services exports are considerably smaller, sometimes even zero. Moreover, the correlation among individual categories of services exports is also smaller. This indicates that their respective income and price elasticities may deviate substantially, and consequently, different weighting schemes used for the computation of effective exchange rate indices have the potential to improve the goodness of fit as well as the forecasting performance of empirical models.

At the same time, correlations are quite high among effective exchange rate indices, especially among indices based on relative consumer prices (table A6). Indices based on unit labor costs typically produce lower correlation coefficients in the range between 0.80 and 0.88. As chart 3 shows, most of the variation between different effective exchange rate indices results from more pronounced ups and downs rather than diverging developments over time. The similar behavior of these indices suggests that replacing the exchange rate index in the regression equation of a specific trade flow variable may not create big differences in either the measures for the goodness of fit or the forecasting performance.

4.2 The results

The combination of 9 indicators of each outward and inward trade flow at current and constant prices and 9 different effective exchange rate indices would give rise to 81 co-integrating two-equation systems for both exports and imports, i.e. a total of 162 co-integrating systems. Some of these equations lack direct economic interpretation because they relate a trade flow variable to an effective exchange rate index based on a non-corresponding weighting, e.g. an effective exchange rate index based on service import and export weights to manufacturing exports. While we skip such models for the presentation of income and price elasticities, we avoid prioritizing "reasonable" combinations for the evaluation of the forecasting performance. Consequently, we estimate 9 co-integrating systems for real total export volumes based on national accounts data and all newly calculated real effective exchange rate indices. For goods exports we estimate 21 co-integrating systems based on a mix of national accounts data at constant prices and current account data at current prices and the relevant effective exchange rate indices. Similarly, we estimate 9 co-integrating systems for services exports based on a mix of national and current accounts data. After screening for negative coefficients of the error correction term (α_{11}), we eliminate two models for services exports due to implausibility. We repeat this exercise for all corresponding definitions of imports.

4.2.1 Elasticities and dynamic multipliers

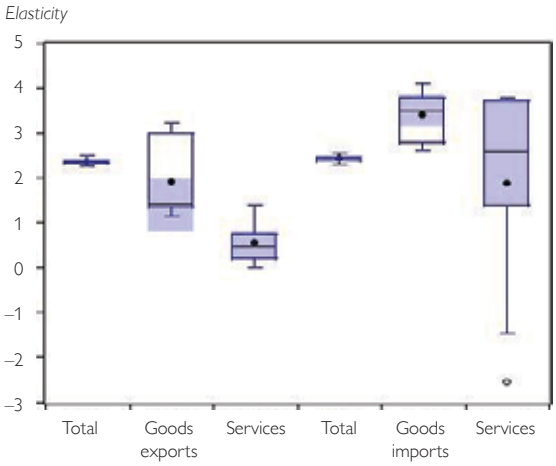
The resulting estimates for the short-run income elasticity of exports and imports are summarized as boxplots in chart 5. For each trade flow, diamonds represent the means of the respective estimates, with the horizontal line within the box showing the median. The variation in the estimates of the income elasticity results from changing the dependent variable in the co-integrating system (e.g. from services exports to tourism exports) and re-estimating each system using appropriate alternative effective exchange rate indices, i.e. in the case of service exports the effective exchange rate indices for services based on consumer prices or alternatively for services based on unit

labor costs. The short-run income elasticity of export regressions shows the instantaneous percentage response of Austrian exports to a 1% quarter-to-quarter increase in world output. The import elasticity indicates the reaction of Austrian imports to a 1% quarter-to-quarter increase in Austria's output. Besides services exports, the estimated values are surprisingly high, indicating demand elasticities between 1 and 3 in both cases (compare the detailed comparison with related empirical studies below). The elasticity for goods exports appears to be higher than the elasticity for services exports because the 95% interval of the boxplot for services does not include the median estimate for goods exports. Estimates for the income elasticity of total exports are almost unaffected by variations in the effective exchange rate index. Both the interquartile range for total exports and the confidence interval of the median are narrow. A similar picture emerges for imports, i.e. the interquartile range widens as we move from total imports to goods and services imports. Finally, the income elasticity for imports of services appears to be somewhat lower than the income elasticity for goods imports, but the precision is low.

Chart 6 shows the dynamic multiplier of trade flows with respect to a 1% increase in the effective exchange rate, i.e. the sum of the coefficients for the contemporaneous competitiveness indicator and all eight lags of the indicator. This value can be interpreted as the accumulated dynamic response to an unexpected increase in price competitiveness. The set-up is identical to the one presented for income elasticities. The price elasticities are similar for exports and imports and only weakly dependent on the exchange rate indicator chosen. Except for the exports and im-

Chart 5

Distribution of estimates for income elasticities[1]

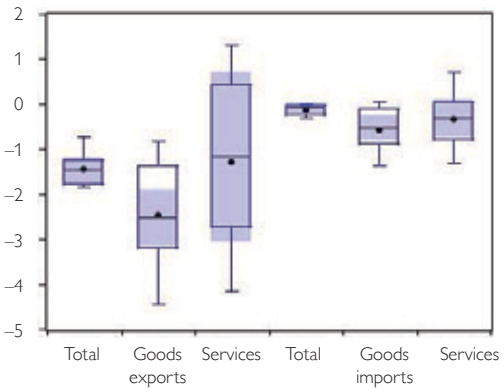


Source: Authors' calculations.

[1] Elasticity of exports with respect to a 1% increase in world GDP and elasticity of imports with respect to a 1% increase in Austrian GDP. The boxplots for total trade volumes are based on 8 models, for goods trade on 18 models, and for services on 10 models. For each trade flow, diamonds represent the means of the respective elasticities, with the horizontal line within the box showing the median. The box itself encloses the interquartile range, i. e. the bottom of the box is the first quartile and the top of the box is the third quartile. Near outliers are shown as circles and far outliers as stars. The staples at the end of each whisker show the last data point within a distance of 1.5 times the interquartile range. The shaded region displays the approximate 95% confidence interval for the median.

Chart 6

Distribution of estimates for dynamic price elasticities[1]



Source: Authors' calculations.

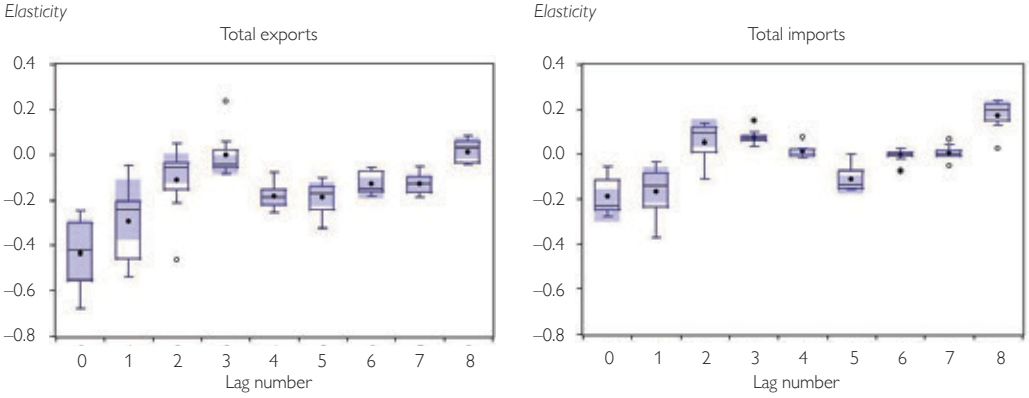
[1] Dynamic elasticities of export and import volumes with respect to a 1% increase of the effective exchange rate index; i.e. the sum over the contemporaneous and all lagged values of the dynamic regression. The boxplots for total trade flows are based on 9 models, for goods trade on 21 models, and for services on 7 models. For each trade flow, diamonds represent the means of the respective dynamic multiplier, with the horizontal line within the box showing the median. The box itself encloses the interquartile range, i. e. the bottom of the box is the first quartile and the top of the box is the third quartile. Near outliers are shown as circles and far outliers as stars. The staples at the end of each whisker show the last data point within a distance of 1.5 times the interquartile range. The shaded region displays the approximate 95% confidence interval for the median.

ports of services, they are less than –1, that is to say, a 1% appreciation is associated with a decline in exports of more than 1%. Surprisingly, imports respond negatively to a 1% appreciation. The variability of estimates for services is much higher than those for total and goods exports. Nevertheless, the negative dynamic multipliers for the elasticity of prices from import regressions contradict theoretical expectations that, in case of an appreciation of the home currency, domestic products and services will be substituted by imports. A possible explanation would be indirect effects resulting from the strong response of exports to an appreciation and the reduction in embodied imported intermediate inputs (Stehrer and Stöllinger, 2013).

Chart 7 disaggregates the dynamic multipliers for total exports and total imports in the national accounts and presents the contemporaneous and lagged responses, i.e. the individual coefficients α_2 through α_{10} in the dynamic regression. In this case, we use all newly calculated export weightings, resulting in 9 estimates at each lag length, which we summarize again as boxplots. The immediate response of exports to a 1% increase in the effective exchange rate is centered around –0.4; it declines quickly towards zero within the next three quarters but rebounds in the fourth quarter to –0.2. Afterwards the elasticity converges slowly to zero. For total imports a similar but subdued picture emerges. Starting with a negative coefficient of –0.2 the elasticity becomes positive already in the second quarter after the exchange rate shock occurred and remains positive or close to zero for most of the following quarters. The first conclusion from chart 7 is that price effects alone will not produce a J-curve effect for Austria because the reduction in exports is immediate and strong, and counterbalancing consequences of rising imports revenues are delayed and small. In order to achieve a J-curve pattern, the indirect effects from reduced exports on domestic output and consequently lower

Chart 7

Distribution of estimates for price elasticities, the dynamic response to an increase in effective exchange rates[1]



Source: Authors' calculations.

[1] *Price elasticities of export and import volumes with respect to a 1% increase of the effective exchange rate index. Each boxplot shows the coefficient at the respective lag length in the dynamic regression model. The boxplots for total trade flows are based on 9 models. Diamonds represent the means of the respective coefficient, with the horizontal line within the box showing the median. The box itself encloses the interquartile range, i. e. the bottom of the box is the first quartile and the top of the box is the third quartile. Near outliers are shown as circles and far outliers as stars. The staples at the end of each whisker show the last data point within a distance of 1.5 times the interquartile range. The shaded region displays the approximate 95% confidence interval for the median.*

import demand will have to be big enough. This result is not surprising because the J-curve effect is based on the invoicing of exports in domestic currency and vice versa. As a great number of contracts is fixed in advance to preempt a surprise appreciation, the currency gain with respect to import payments will create a temporary surplus. Being a small open economy and a founding member of European monetary union, Austria should have seen a decline in its share of foreign currency-denominated invoices. Furthermore, the use of hedging instruments against currency fluctuations and variations in raw material prices has become more widespread over time.

The second conclusion from chart 7 is that choosing a small lag length for the dynamic regression will underestimate the dynamic response of trade flows to exchange rate shocks. Typically, some of the higher order coefficients – at lag lengths between four to seven – turn out to be significant, and a specification search looking for a parsimonious representation of the underlying model is likely to cut at lag lengths of two or three. Zorzi and Schnatz (2007), for example, restrict their dynamic regression for total euro area exports to the contemporaneous competitiveness indicator and present estimates around –0.3, which fits closely into the interquartile range for the contemporaneous coefficient in chart 7. Similarly, Bayoumi et al. (2007) present estimates between –0.5 and –0.7 for the contemporaneous competitiveness indicator, using annual data and a trade-weighted GDP indicator. The Deutsche Bundesbank (2016) only presents long-run elasticities β_2 taking values around –0.35. The corresponding values in our long-run regression for total exports are between –1 and –2.6; but if we chose the Central Planning Bureau volume indicator of world trade as the demand indicator, the estimated long-run elasticities are around –0.4, i.e. quite close to the Deutsche Bundesbank measure (2016). Another effect of choosing world trade as the indicator of foreign demand is a lower income elasticity for total exports in the dynamic regression centered around 0.7, which also corresponds to the value of 0.8 presented by Zorzi and Schnatz (2007).

4.2.2 In-sample fit and out-of-sample forecasting performance

In the next step of our evaluation, we do not restrict our analysis to models that make economic sense but rather include all import-export weighted effective exchange rates in candidate models and search for the combination with the closest in-sample fit and – alternatively – the best ex ante predictive power based on recursive estimations of the co-integrating systems. The comparison of the in-sample fit is based on the coefficient of determination (R^2) resulting from the full sample. The out-of-sample forecasting evaluation starts with a model based on data from Q1 96 through Q4 13. In a recursive procedure we add step by step one quarter to the estimation sample using quarterly data and replacing the effective exchange rate index in the estimation of the co-integrating systems. Because the import elasticities are negative or small, we conclude that Austrian imports do not respond strongly to variations in short-term price/cost competitiveness. Consequently, we can restrict the following presentation to exports only.

We measure the in-sample fit by the coefficient of determination (R^2) in the dynamic regression, which describes the share of the variation in the changes in exports against the previous quarter explained by the regression model. To

assess the out-of-sample predictive power we use the root mean squared forecast error (RMSE) based on forecasts using the realized future values of the explanatory variables. This "perfect foresight" set-up avoids any modeling of the explanatory variables and creates an equivalent and fully reproducible environment for all ex-ante forecasting cycles.

Column three of table 1 shows the label of the effective exchange rate index for which the coefficient of determination is maximized. We can only identify three export variables for which the model with the best in-sample fit actually includes the "theoretically appropriate" effective exchange rate index. We apply the term "theoretically appropriate" for models where the weighting of the effective exchange rate index corresponds broadly to the modeled trade flow variable and for which the dynamic multiplier simultaneously has the expected negative sign. In general, models based on effective exchange rate indices using unit labor costs of the whole economy as the deflator produce the best in-sample fit, and the coefficients of determination do not markedly differ between *the aggregate cost competitiveness indicator* (E_TULC) and *service cost competitiveness indicator* (E_SULC). Furthermore, models based on indices using relative producer prices have on average a distinctly better fit than models using the HICP/CPI deflator. Finally, service exports are harder to explain by our simple co-integration systems than total or goods exports; their R^2 is lower by 20 to 30 percentage points. The ranking provides a clear picture but we want to emphasize that the difference between alternative unit labor cost-based indices in terms of their in-sample fit is small.

The analysis of ex ante prediction errors in table 1 gives a more diverse impression about the usefulness of individual indicators of competitiveness. The models for total and goods exports

Table 1

Comparison of regression results for trade flow variables using different indicators of competitiveness with respect to in-sample fit and out-of-sample forecasting performance

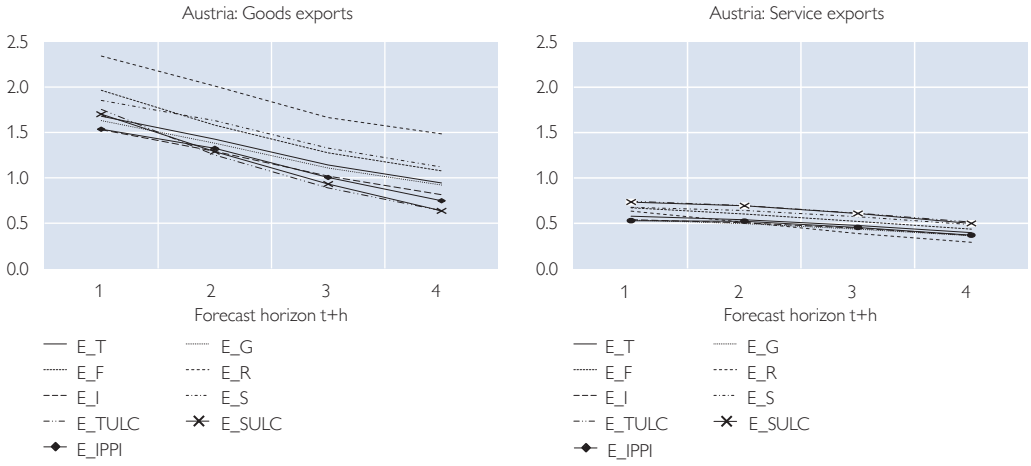
		Model including effective exchange rate "E_.." as the competitiveness indicator producing the best fit in terms of				
		in-sample fit	ex ante predictive power			
Trade flow variable	Price elasticity	R^2	RMSE			
			1-step	2-step	3-step	4-step
Trade flows at constant prices						
NA_X	–1.44	E_SULC	E_IPPI	E_IPPI	E_TULC	E_TULC
NA_XG	–1.60	E_SULC	E_I	E_TULC	E_TULC	E_SULC
NA_XS	–1.01	E_TULC	E_IPPI	E_G	E_R	E_R
Trade flows at current prices						
CA_XGN	–3.00	E_SULCN	E_IPPIN	E_IPPIN	E_IPPIN	E_IPPIN
CA_XSN	–2.18	E_SULCN	E_FN	E_SN	E_SN	E_SN

Source: Authors' calculations.

Note: Compare table A4 for a definition of labels. Models for export flows are based on world output and the respective effective exchange rate indicator. Price elasticity is the average elasticity across the nine effective exchange rate indices. The in-sample fit is measured by the coefficient of determination (R^2) based on quarterly data from Q1 95 through Q1 16. The first out-of-sample forecast is based on quarterly data and the estimation sample runs from Q1 95 through Q4 13. We expand the window of the estimation sample by adding one quarter after another to this sample. This gives us nine 1-step ahead forecast errors, eight 2-step ahead forecasting errors, seven 3-step ahead forecasting errors, and six 4-step ahead forecasting errors for computing the root mean squared errors (RMSE).

Chart 8

Quality of model forecast for exports for various indicators of competitiveness relative to random walk forecast



Source: Authors' calculations.

Note: Compare table A4 for a definition of labels. RMSE for 1- to 4-step-ahead recursive predictions under perfect foresight of model forecasts relative to RMSE of naive random walk forecasts. Estimation sample from Q1 96 through Q4 13 and forecast period from Q1 14 through Q1 16.

data from the national accounts including the unit labor cost-based indicators dominate at the 3- and 4-step ahead forecast horizons, while models including the producer price-based indicator dominate at short-run forecast horizons. At the 1-step ahead horizon the HICP/CPI-based effective exchange rate using the weights from trade in industrial goods has the lowest RMSE. While we cannot find a clear and reasonable picture for real service exports, the best model for nominal service exports includes the HICP/CPI-based index using the service's weight (compare the lower panel of table 1). Chart 8 provides a more informative ranking of competitiveness indicators for real goods and service exports, respectively. The lines in chart 8 are ratios of the RMSE from forecasts based on the dynamic model to the RMSE from a naïve random walk forecast. A value above one indicates that random walk forecasts at this horizon have a lower prediction error than model-based forecasts. A value below one shows that model-based prediction using short- and long-run information about demand and competitiveness have the potential to outperform the random walk approach. At short forecasting horizons, the random walk model beats all model-based forecasts for real goods exports. Starting with the 3-step ahead horizon, models based on indicators using total unit labor costs as the deflator produce lower recursive prediction errors; although the effects of the weighting scheme (aggregate versus service sector based on total unit labor costs) are not distinguishable. Contrary to goods exports, the outflow of services is clearly better predicted by models using demand and competitiveness indicators. Interestingly, the models' performance becomes better with increasing forecast horizons. Models using service-related weighting schemes, however, do not perform better in terms of a lower RMSE. On the contrary, at the 1- and 2-step horizons indices based on goods related weightings dominate and at the 3- to 4-step hori-

zons the raw material-based weighting produces lower prediction errors. One explanation for this may be the high U.S. dollar weighting in the index based on raw materials – but we emphasize that due to the small sample size we have only six 4-step ahead forecasts available to compute the RMSE; moreover, only two of them are from non-overlapping forecast horizons and model-based forecasts certainly benefit from using realized values of explanatory variables.

Similar to Zorzi and Schnatz (2007) we confirm that unit labor cost-based indicators have a better forecasting performance at longer forecast horizons. Using a cross validation approach Deutsche Bundesbank (2016) also identifies models including the effective real exchange rate based on total unit labor costs as the ones producing the lowest prediction error.

5 Conclusions

The relation between price competitiveness and foreign trade imbalances regained attention after the global crisis 2008 hit the world economy. Specifically, within the euro area imbalances had emerged in the years before the onset of the crisis which had to be unwound afterwards. Improving the price competitiveness in those countries that faced substantial current account deficits was seen as a crucial precondition for unwinding the imbalances within the euro area. In general, small open economies have to pursue policies that allow them to remain competitive. In the short run, competitiveness burns down to the price competitiveness of the external sector, which is driven by relative price changes reflecting the level of labor and capital costs, productivity gains or losses, and exchange rates. Thus, any assessment of the price competitiveness of a country starts by analyzing how its exchange rates, domestic price and cost indices have changed compared with those of its trading partners. Across the Eurosystem, various (harmonized) indicators are used to monitor and assess the national short-term price/cost competitiveness performance of individual member countries. They are calculated on the basis of weighted averages of bilateral exchange rates vis-à-vis the currencies of the trading partners of each euro area country and are deflated by appropriate cost and price indices.

The Austrian competitiveness indicator, which is based on the Eurosystem-wide harmonized methodology, is compiled by the OeNB in cooperation with WIFO, the Austrian Institute of Economic Research. It includes Austria's 56 most important trading partners. The aggregate indicator is composed of four subindices for manufactured goods, food, raw materials and energy products, and services. The individual country weights in the subindex for manufactured goods continue to be calculated on the basis of single (bilateral) import and double (multilateral) export weights. The remaining subindices use only single (bilateral) import and export weights. Three different deflators are used for the calculation of the harmonized competitiveness indicator, each having its own pros and cons in terms of timely availability across countries, international comparability, and the degree of focus on tradable goods. The three deflators are the HICP/CPI, producer prices, and unit labor costs of the total economy.

The harmonized competitiveness indicator is obtained by chain linking. The latest revision takes into account the most up-to-date set of comparable external trade data for the period from 2010 to 2012, bringing the series of country weights used to compute effec-

tive exchange rates up to six consecutive three-year periods, starting in 1995. The comparison of these six sets of country weights highlights the re-orientation of trade flows from previous target markets towards countries that joined the EU in 2004 and 2007 as well as the rising importance of China as a destination for Austrian exporters. Based on the weighting for the 2010–2012 period, the aggregate index (export- and import-weighted across all subindices) continues to be characterized by a high foreign trade share of the countries that joined the EU before 2004 (57%), slightly down from its previous period's share. Countries that acceeded the EU in 2004 and 2007 now account for a weight of 13.4% – nearly double the share they had at the turn of the millennium. On an individual country basis, Germany continues to have the largest weight (33.1%), followed by Italy (7.2%) and the U.S.A. (7.1%). With a trade weight of 4.7% China not only gained in importance, it also surpassed traditional Austrian export destinations like France and Switzerland (3.7% and 4.1%, respectively).

In general, Austria's competitiveness remained fairly stable after 2008, with the competitivenesss indices fluctuating within a narrow band. Most of the variation was due to bilateral exchange rate movements of the U.S. dollar and the Japanese yen rather than deviating developments of the respective price and cost indicators. With respect to the members of the Eurosystem, adjustments of bilateral exchange rates vis-à-vis Austria are no longer possible, the burden of adjustment fully applies to relative changes of deflators, i.e. the HICP, the producer prices or unit labor costs. Therefore, those European countries that had built up comparatively high macroeconomic imbalances and/or unsustainable current account deficits by the time the economic crisis hit, were forced to take measures to significantly improve their unit labor cost positions, i.e. moderate their wage increases or even cut wages and improve productivity. Vis-à-vis these countries, Austria has seen comparatively stronger increases in total unit labor costs, implying a loss of cost competitiveness since 2008.

Empirical models of aggregate trade flows usually include indicators of demand, like foreign or domestic output, as well as indicators of competitiveness, like real effective exchange rates, as explanatory variables. In this study, we compare the predictive power of all newly calculated effective exchange rate indices with respect to total foreign trade flows and subgroups like manufactured goods and services. While an appreciation of the real effective exchange rate on average yields a drop in Austrian export activity, import substitution appears to be very weak, and some models even show reversed signs. Out of the nine available real effective exchange rates, the models using deflators based on total unit labor costs have the best in-sample fit and in most cases they also have the lowest prediction errors for longer forecast horizons. Although our results suffer from the small sample available, we conclude that the imprecise measurement of unit labor costs (total economy) and the comparatively small country sample for which unit labor cost-based indices can be constructed do not dampen their empirical success, although models using producer price-based indices perform well at shorter forecast horizons.

With respect to the opportunities of improving data collection, we expect that concentrating efforts on more narrowly defined unit labor cost measures (as is the case with the manufac-

turing index) could significantly improve the explanatory power of empirical trade models and consequently their forecasting performance. With Austria being a small open economy, enhanced competitiveness indicators may also improve the overall precision of macroeconomic forecasts.

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Annex

Table A1

Weighting scheme of the new exchange rate index

Competing countries	Austrian exports						Austrian imports					
	Manufactured goods	Raw materials, energy products	Food	Goods	Services	Total	Manufactured goods	Raw materials, energy products	Food	Goods	Services	Total
	Country weights in %, calculated for the period from 2010 to 2012											
Belgium	2.63	0.42	0.74	2.35	1.61	2.16	1.81	0.52	1.78	1.58	1.45	1.56
Bulgaria	0.41	0.35	0.53	0.41	0.51	0.44	0.35	0.07	0.30	0.29	1.02	0.44
Denmark	0.59	0.25	0.59	0.56	0.75	0.61	0.45	0.11	0.67	0.41	0.38	0.40
Germany	23.95	31.18	32.83	25.05	40.43	29.11	41.11	29.62	39.35	38.97	30.23	37.20
Estonia	0.06	0.05	0.08	0.06	0.06	0.06	0.03	0.03	0.04	0.03	0.14	0.06
Finland	0.61	0.13	0.27	0.56	0.47	0.53	0.49	0.16	0.06	0.40	0.97	0.52
France	5.96	1.53	2.16	5.40	2.42	4.61	3.32	0.77	3.64	2.90	2.54	2.82
Greece	0.32	0.16	0.74	0.34	0.28	0.32	0.10	0.07	0.61	0.13	1.06	0.32
United Kingdom	3.16	1.12	1.94	2.94	3.62	3.12	1.83	0.85	1.02	1.60	4.34	2.16
Ireland	0.69	0.02	0.09	0.61	0.42	0.56	0.55	0.04	0.36	0.45	0.94	0.55
Italy	7.20	22.42	14.16	8.72	5.48	7.87	6.70	4.29	11.39	6.59	6.29	6.53
Latvia	0.07	0.03	0.09	0.07	0.09	0.08	0.02	0.03	0.04	0.02	0.12	0.04
Lithuania	0.11	0.04	0.13	0.10	0.08	0.10	0.05	0.04	0.16	0.06	0.33	0.11
Luxembourg	0.15	0.03	0.05	0.14	0.77	0.30	0.24	0.00	0.02	0.18	1.04	0.35
Malta	0.02	0.03	0.08	0.02	0.13	0.05	0.01	0.00	0.00	0.01	0.17	0.04
Netherlands	2.73	0.92	2.28	2.57	4.18	3.00	2.71	2.00	6.43	2.83	2.34	2.73
Poland	2.95	0.84	1.69	2.72	1.54	2.41	1.63	2.02	4.15	1.87	2.29	1.95
Portugal	0.42	0.13	0.15	0.39	0.24	0.35	0.45	0.10	0.17	0.37	0.48	0.39
Romania	1.05	1.33	1.41	1.09	1.73	1.26	0.93	0.64	0.54	0.85	1.86	1.06
Sweden	1.42	0.11	0.82	1.29	1.28	1.29	1.31	0.48	0.20	1.09	1.43	1.16
Slovakia	1.20	5.40	1.81	1.53	1.71	1.58	1.93	5.01	1.45	2.44	2.94	2.54
Slovenia	0.44	5.01	3.65	0.98	1.14	1.02	1.11	1.95	0.95	1.24	1.72	1.34
Spain	2.44	0.57	1.40	2.24	0.81	1.86	1.73	0.25	3.26	1.57	2.17	1.69
Czech Republic	2.91	6.18	3.05	3.14	2.40	2.95	3.58	4.79	2.67	3.74	3.43	3.67
Hungary	1.66	6.86	4.43	2.21	2.77	2.36	2.44	3.69	4.82	2.82	3.87	3.03
Cyprus	0.02	0.01	0.12	0.03	0.31	0.10	0.04	0.01	0.06	0.04	0.41	0.11
Australia	0.49	0.10	0.57	0.47	0.25	0.41	0.04	0.07	0.11	0.05	0.28	0.10
Chile	0.15	0.00	0.09	0.14	0.05	0.11	0.05	0.27	0.29	0.10	0.05	0.09
Iceland	0.02	0.00	0.02	0.02	0.02	0.02	0.01	0.00	0.01	0.01	0.08	0.02
Israel	0.28	0.22	0.17	0.27	0.23	0.26	0.17	0.02	0.16	0.15	0.20	0.16
Japan	2.49	1.19	0.76	2.29	0.54	1.83	1.95	0.04	0.05	1.49	0.36	1.26
Canada	0.78	0.03	0.10	0.68	0.33	0.59	0.34	0.16	0.08	0.29	0.44	0.32
Mexico	0.65	0.01	0.03	0.56	0.11	0.44	0.23	0.04	0.15	0.19	0.11	0.18
New Zealand	0.06	0.00	0.07	0.06	0.06	0.06	0.03	0.02	0.29	0.05	0.10	0.06
Norway	0.42	0.04	0.20	0.38	0.38	0.38	0.19	2.01	0.24	0.51	0.38	0.48
Switzerland	3.07	4.44	3.72	3.21	6.89	4.18	4.47	1.39	3.15	3.84	4.39	3.95
South Korea	1.79	0.75	0.68	1.64	0.27	1.28	0.63	0.01	0.02	0.48	0.14	0.41
Turkey	1.40	1.28	0.93	1.36	1.12	1.29	0.90	0.28	1.28	0.82	1.29	0.91
U.S.A.	6.68	2.02	10.32	6.61	7.47	6.83	5.56	15.73	5.30	7.33	7.02	7.27
Bosnia and Herzegovina	0.11	0.15	0.44	0.13	0.25	0.16	0.27	0.32	0.05	0.26	0.30	0.27
Brazil	1.04	0.10	0.60	0.94	0.21	0.75	0.16	1.07	1.54	0.41	0.26	0.38
China	7.80	1.74	0.18	6.87	0.81	5.27	6.47	0.37	0.80	5.02	0.84	4.17
Hong Kong	0.76	0.05	0.15	0.67	0.18	0.54	0.11	0.00	0.00	0.08	0.28	0.12
India	1.14	0.28	0.06	1.01	0.25	0.81	0.53	0.06	0.30	0.43	0.32	0.41
Iran	0.23	0.02	0.09	0.20	0.09	0.17	0.02	0.59	0.09	0.13	0.10	0.12
Croatia	0.60	1.14	1.17	0.68	0.97	0.76	0.57	0.23	0.31	0.49	2.72	0.94
Malaysia	0.48	0.01	0.02	0.42	0.06	0.32	0.30	0.04	0.04	0.24	0.39	0.27
Russian Federation	2.46	0.32	2.25	2.30	2.14	2.26	0.38	13.28	0.06	2.63	2.73	2.65
Saudi Arabia	0.32	0.06	0.30	0.30	0.17	0.27	0.03	1.53	0.00	0.29	0.13	0.26
Serbia	0.31	0.38	0.43	0.33	0.48	0.37	0.21	0.19	0.56	0.23	0.50	0.28
Singapore	0.69	0.00	0.08	0.60	0.12	0.47	0.14	0.00	0.01	0.11	0.17	0.12
South Africa	0.54	0.02	0.31	0.49	0.11	0.39	0.08	1.73	0.42	0.40	0.37	0.39
Taiwan	0.67	0.17	0.06	0.60	0.12	0.47	0.57	0.01	0.01	0.43	0.16	0.37
Thailand	0.53	0.04	0.02	0.46	0.11	0.37	0.39	0.07	0.32	0.33	0.42	0.35
Ukraine	0.54	0.22	0.52	0.52	0.51	0.51	0.20	2.88	0.19	0.67	0.93	0.72
United Arab Emirates	0.30	0.10	0.35	0.29	0.49	0.34	0.08	0.03	0.00	0.06	0.57	0.17
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: OeNB, WIFO.

Table A1 (continued)

Weighting scheme of the new exchange rate index

Competing countries	Exports and imports					
	Manu-factured goods	Raw materi-als, energy products	Food	Goods	Services	Total
	Country weights in %, calculated for the period from 2010 to 2012					
Belgium	2.24	0.49	1.27	1.96	1.54	1.86
Bulgaria	0.38	0.15	0.41	0.35	0.73	0.44
Denmark	0.52	0.15	0.63	0.48	0.59	0.51
Germany	32.19	30.05	36.15	32.19	36.05	33.12
Estonia	0.05	0.03	0.06	0.05	0.09	0.06
Finland	0.55	0.16	0.16	0.48	0.69	0.53
France	4.69	0.98	2.92	4.11	2.47	3.73
Greece	0.22	0.09	0.68	0.23	0.62	0.32
United Kingdom	2.52	0.92	1.47	2.25	3.93	2.64
Ireland	0.63	0.04	0.23	0.53	0.64	0.55
Italy	6.96	9.20	12.75	7.63	5.83	7.21
Latvia	0.04	0.03	0.07	0.04	0.11	0.06
Lithuania	0.08	0.04	0.15	0.08	0.19	0.10
Luxembourg	0.19	0.01	0.04	0.16	0.88	0.33
Malta	0.01	0.01	0.04	0.01	0.15	0.05
Netherlands	2.72	1.71	4.39	2.71	3.39	2.87
Poland	2.32	1.70	2.94	2.28	1.86	2.18
Portugal	0.44	0.10	0.16	0.38	0.34	0.37
Romania	0.99	0.83	0.97	0.97	1.79	1.16
Sweden	1.37	0.38	0.51	1.19	1.35	1.22
Slovakia	1.55	5.12	1.63	2.00	2.23	2.05
Slovenia	0.76	2.78	2.28	1.11	1.39	1.18
Spain	2.10	0.34	2.34	1.90	1.39	1.78
Czech Republic	3.23	5.17	2.86	3.45	2.84	3.31
Hungary	2.03	4.55	4.63	2.52	3.24	2.69
Cyprus	0.03	0.01	0.09	0.03	0.35	0.11
Australia	0.28	0.08	0.34	0.26	0.27	0.26
Chile	0.10	0.20	0.19	0.12	0.05	0.10
Iceland	0.02	0.00	0.01	0.02	0.04	0.02
Israel	0.23	0.08	0.16	0.21	0.22	0.21
Japan	2.23	0.35	0.40	1.88	0.47	1.55
Canada	0.57	0.12	0.09	0.48	0.37	0.46
Mexico	0.45	0.03	0.09	0.37	0.11	0.31
New Zealand	0.05	0.01	0.18	0.05	0.08	0.06
Norway	0.31	1.48	0.22	0.45	0.38	0.43
Switzerland	3.74	2.22	3.43	3.53	5.82	4.07
South Korea	1.24	0.21	0.34	1.05	0.21	0.85
Turkey	1.16	0.55	1.10	1.08	1.19	1.10
U.S.A.	6.14	12.02	7.77	6.98	7.27	7.05
Bosnia and Herzegovina	0.18	0.27	0.24	0.20	0.27	0.22
Brazil	0.61	0.81	1.08	0.67	0.23	0.57
China	7.16	0.74	0.50	5.92	0.82	4.72
Hong Kong	0.45	0.01	0.07	0.37	0.22	0.33
India	0.84	0.12	0.18	0.71	0.28	0.61
Iran	0.13	0.44	0.09	0.16	0.09	0.15
Croatia	0.59	0.47	0.73	0.58	1.72	0.85
Malaysia	0.39	0.03	0.03	0.32	0.20	0.30
Russian Federation	1.46	9.77	1.14	2.47	2.39	2.45
Saudi Arabia	0.18	1.13	0.15	0.30	0.15	0.26
Serbia	0.26	0.24	0.50	0.28	0.49	0.32
Singapore	0.43	0.00	0.04	0.35	0.14	0.30
South Africa	0.32	1.27	0.37	0.44	0.22	0.39
Taiwan	0.62	0.05	0.03	0.51	0.14	0.42
Thailand	0.46	0.06	0.17	0.39	0.25	0.36
Ukraine	0.38	2.16	0.36	0.60	0.69	0.62
United Arab Emirates	0.19	0.05	0.18	0.17	0.52	0.25
Total	100.00	100.00	100.00	100.00	100.00	100.00

Source: OeNB, WIFO.

Table A2

Competition matrix for manufactured goods exports

Competing countries	Destinations													
	Belgium	Bulgaria	Denmark	Germany	Estonia	Finland	France	Greece	United Kingdom	Ireland	Italy	Latvia	Lithuania	Luxembourg
	Market shares in %, calculated for the period from 2010 to 2012													
Belgium	10.26	1.47	3.16	3.76	2.38	1.57	4.84	2.23	3.65	2.20	1.84	1.85	5.08	16.45
Bulgaria	0.23	47.29	0.11	0.15	0.09	0.02	0.07	1.22	0.06	0.02	0.20	0.19	0.17	0.07
Denmark	0.34	0.22	27.41	0.57	1.38	1.29	0.24	0.29	0.67	0.88	0.16	1.60	1.92	0.20
Germany	16.69	9.03	16.83	54.52	13.47	6.74	10.55	7.24	10.79	6.48	6.88	10.29	14.40	18.52
Estonia	0.05	0.02	0.24	0.03	4.29	1.17	0.01	0.01	0.03	0.01	0.02	5.03	2.50	0.00
Finland	0.44	0.21	1.12	0.34	9.81	60.70	0.16	0.19	0.39	0.17	0.15	2.18	1.76	0.08
France	9.43	2.39	2.97	4.61	2.00	1.39	57.26	3.03	4.06	2.43	3.21	1.64	2.89	7.03
Greece	0.07	3.13	0.15	0.09	0.05	0.02	0.05	54.07	0.11	0.03	0.14	0.05	0.09	0.03
United Kingdom	5.11	1.19	3.48	2.17	2.04	1.47	1.95	1.78	41.93	20.05	1.28	1.50	2.26	1.40
Ireland	5.88	0.21	0.56	0.47	0.14	0.19	0.45	0.47	1.72	43.78	0.33	0.27	0.30	0.30
Italy	3.58	6.03	2.77	3.24	3.59	1.35	4.43	6.67	2.90	1.38	68.09	3.26	5.08	2.25
Latvia	0.02	0.05	0.30	0.03	7.59	0.14	0.01	0.01	0.02	0.01	0.01	21.10	6.93	0.01
Lithuania	0.07	0.14	0.54	0.09	4.17	0.16	0.05	0.02	0.07	0.07	0.03	7.95	7.05	0.03
Luxembourg	0.48	0.05	0.13	0.18	0.07	0.04	0.18	0.03	0.07	0.04	0.06	0.05	0.08	31.45
Malta	0.01	0.02	0.02	0.03	0.00	0.01	0.02	0.03	0.03	0.01	0.02	0.00	0.01	0.00
Netherlands	10.53	1.76	4.98	4.14	3.31	2.34	2.66	2.26	3.79	2.64	1.75	2.38	3.77	4.29
Poland	1.13	1.31	2.65	2.26	5.44	0.69	0.87	0.83	1.40	0.44	0.86	6.15	10.45	0.82
Portugal	0.36	0.13	0.35	0.41	0.18	0.09	0.55	0.17	0.36	0.19	0.17	0.13	0.14	0.16
Romania	0.31	3.32	0.22	0.59	0.32	0.10	0.37	0.62	0.26	0.13	0.66	0.20	0.27	0.05
Sweden	2.06	0.41	9.21	0.80	10.52	5.83	0.55	0.46	1.03	0.52	0.39	2.74	3.35	0.45
Slovakia	0.37	1.20	0.63	0.87	0.40	0.16	0.41	0.28	0.39	0.11	0.36	1.22	0.90	0.29
Slovenia	0.10	0.69	0.29	0.32	0.32	0.05	0.17	0.10	0.09	0.03	0.23	0.29	0.49	0.13
Spain	1.93	0.90	1.11	1.39	0.74	0.48	3.50	2.21	1.74	0.99	1.68	0.65	1.01	0.86
Czech Republic	1.16	1.66	1.27	2.61	1.71	0.57	0.71	0.45	0.98	0.44	0.56	1.60	2.53	0.58
Hungary	0.43	2.39	0.70	1.39	1.07	0.19	0.41	0.38	0.64	0.25	0.41	1.14	1.07	0.34
Cyprus	0.00	0.03	0.00	0.00	0.01	0.00	0.00	0.41	0.01	0.00	0.00	0.02	0.03	0.00
Australia	0.10	0.03	0.09	0.04	0.02	0.03	0.03	0.02	0.21	0.08	0.03	0.03	0.01	0.01
Chile	0.37	0.00	0.02	0.01	0.00	0.00	0.09	0.43	0.01	0.00	0.20	0.00	0.00	0.00
Iceland	0.00	0.00	0.03	0.04	0.02	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.07
Israel	1.05	0.45	0.09	0.10	0.10	0.10	0.12	0.25	0.42	0.09	0.12	0.31	0.20	0.06
Japan	2.09	0.22	0.45	1.20	1.14	0.65	0.62	0.42	1.64	1.03	0.49	0.35	0.26	0.92
Canada	0.51	0.04	0.17	0.13	0.35	0.18	0.18	0.07	0.76	0.36	0.08	0.67	0.29	0.44
Mexico	0.24	0.01	0.15	0.24	0.02	0.05	0.07	0.02	0.14	0.30	0.09	0.02	0.32	0.03
New Zealand	0.01	0.00	0.03	0.01	0.01	0.01	0.01	0.00	0.03	0.02	0.01	0.01	0.01	0.00
Norway	0.26	0.03	1.55	0.21	1.39	0.61	0.09	0.14	0.34	0.37	0.06	0.35	0.62	0.13
Switzerland	1.41	0.91	1.15	2.17	0.83	0.63	1.29	1.56	1.64	0.98	1.40	1.41	0.82	1.13
South Korea	0.65	0.46	0.52	0.55	0.76	0.45	0.34	2.07	0.70	0.48	0.38	1.31	0.72	0.27
Turkey	0.61	4.42	0.93	0.68	1.03	0.18	0.54	1.46	1.02	0.41	0.64	0.65	1.42	0.17
U.S.A.	8.02	0.54	1.94	2.21	1.49	1.52	1.56	0.88	4.68	7.07	1.13	2.25	3.93	2.70
Bosnia and Herzegovina	0.01	0.03	0.00	0.04	0.00	0.00	0.01	0.01	0.00	0.00	0.06	0.00	0.01	0.13
Brazil	0.37	0.15	0.33	0.19	0.32	0.08	0.09	0.04	0.20	0.17	0.18	0.07	0.06	0.06
China	5.30	2.94	6.90	4.15	8.26	4.79	2.57	5.10	6.09	2.69	3.14	8.38	7.97	6.29
Hong Kong	0.86	0.14	0.84	0.64	0.96	0.76	0.44	0.23	1.08	0.37	0.38	1.10	0.51	0.37
India	1.60	0.29	0.79	0.38	0.59	0.19	0.27	0.32	0.95	0.40	0.41	0.65	0.50	0.03
Iran	0.12	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.03	0.00	0.00	0.00
Croatia	0.03	0.11	0.04	0.07	0.04	0.02	0.02	0.03	0.02	0.02	0.15	0.05	0.06	1.05
Malaysia	0.20	0.09	0.18	0.29	0.23	0.15	0.19	0.08	0.29	0.23	0.08	0.34	0.19	0.01
Russian Federation	1.17	1.36	0.97	0.27	4.33	1.75	0.04	0.35	0.17	0.22	0.48	6.09	4.69	0.02
Saudi Arabia	0.47	0.07	0.00	0.02	0.06	0.01	0.03	0.20	0.08	0.01	0.12	0.00	0.10	0.02
Serbia	0.02	0.49	0.02	0.06	0.01	0.01	0.02	0.11	0.02	0.01	0.11	0.03	0.19	0.00
Singapore	1.26	0.05	0.27	0.33	0.09	0.12	0.51	0.06	0.70	0.70	0.05	0.14	0.08	0.03
South Africa	0.49	0.05	0.02	0.25	0.20	0.04	0.06	0.05	0.39	0.09	0.08	0.02	0.07	0.04
Taiwan	0.37	0.31	0.42	0.37	1.04	0.56	0.15	0.21	0.63	0.23	0.23	0.91	0.82	0.17
Thailand	0.48	0.06	0.70	0.17	0.45	0.26	0.13	0.24	0.38	0.33	0.12	0.27	0.35	0.04
Ukraine	0.05	1.42	0.14	0.08	1.12	0.03	0.02	0.18	0.05	0.00	0.21	1.03	1.11	0.01
United Arab Emirates	0.84	0.05	0.02	0.03	0.04	0.08	0.04	0.03	0.15	0.01	0.04	0.08	0.16	0.02
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Single export weights	1.53	0.54	0.57	30.84	0.08	0.45	4.69	0.37	3.14	0.26	5.76	0.11	0.14	0.15

Source: OeNB, WIFO.

Table A2 (continued)

Competition matrix for manufactured goods exports

Competing countries	Destinations													
	Malta	Neth-erlands	Poland	Portu-gal	Roma-nia	Swe-den	Slova-kia	Slove-nia	Spain	Czech Repub-lic	Hun-gary	Cyprus	Aus-tralia	Chile
	Market shares in %, calculated for the period from 2010 to 2012													
Belgium	1.13	8.74	2.22	2.16	1.56	2.29	1.56	2.62	1.75	2.05	2.23	1.71	0.52	0.47
Bulgaria	0.06	0.07	0.13	0.02	1.77	0.04	0.20	0.31	0.05	0.13	0.25	0.29	0.00	0.01
Denmark	0.28	0.76	0.57	0.23	0.36	3.12	0.43	0.32	0.26	0.32	0.56	0.58	0.18	0.15
Germany	4.48	18.58	16.57	8.70	12.83	10.51	18.52	19.70	6.99	21.55	20.64	6.65	2.54	2.97
Estonia	0.02	0.03	0.07	0.01	0.01	0.84	0.04	0.03	0.02	0.04	0.03	0.06	0.00	0.00
Finland	0.23	1.10	0.60	0.13	0.23	2.32	0.21	0.44	0.18	0.21	0.42	0.12	0.17	0.28
France	4.94	4.34	2.83	4.35	4.69	2.66	3.94	5.58	5.22	2.51	3.86	2.27	0.99	0.99
Greece	0.31	0.09	0.08	0.12	0.77	0.04	0.06	0.15	0.06	0.06	0.09	9.53	0.02	0.02
United Kingdom	5.16	4.54	1.81	1.68	1.63	2.85	1.20	1.47	1.89	1.76	1.75	4.79	1.32	0.55
Ireland	0.18	0.96	0.27	0.50	0.53	0.31	0.11	0.16	0.65	0.33	0.30	0.26	0.20	0.07
Italy	7.84	2.78	4.19	4.40	9.20	1.82	4.43	15.43	3.65	3.09	4.47	6.30	0.89	1.09
Latvia	0.02	0.03	0.15	0.00	0.04	0.14	0.04	0.03	0.00	0.03	0.02	0.37	0.00	0.00
Lithuania	0.02	0.08	0.26	0.06	0.06	0.31	0.07	0.05	0.03	0.09	0.11	0.03	0.00	0.00
Luxembourg	0.05	0.19	0.11	0.04	0.06	0.08	0.08	0.21	0.04	0.09	0.06	0.20	0.01	0.02
Malta	3.23	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.00	0.01	0.03	0.00	0.00
Netherlands	2.09	3.23	3.06	2.78	2.00	2.81	2.11	3.21	1.94	4.34	2.95	2.36	0.46	0.42
Poland	0.52	1.70	46.33	0.61	2.53	1.81	5.15	2.20	0.66	5.27	4.34	1.64	0.08	0.06
Portugal	0.21	0.42	0.16	47.40	0.39	0.17	0.18	0.18	1.75	0.23	0.19	0.32	0.02	0.12
Romania	0.08	0.38	0.49	0.18	36.40	0.19	1.23	1.03	0.20	0.58	2.46	0.70	0.01	0.02
Sweden	0.13	1.61	1.26	0.49	0.37	54.73	0.48	0.56	0.41	0.69	0.76	0.31	0.50	0.42
Slovakia	0.18	0.52	1.73	0.20	1.60	0.54	20.65	2.24	0.28	5.14	3.64	0.54	0.03	0.02
Slovenia	0.06	0.15	0.31	0.07	0.54	0.11	0.54	8.65	0.05	0.41	0.70	0.11	0.01	0.01
Spain	1.29	1.45	1.27	16.66	1.78	0.79	1.00	2.14	63.78	1.15	1.65	2.39	0.43	1.18
Czech Republic	0.44	1.47	2.87	0.53	2.02	1.00	14.88	2.74	0.57	34.99	3.37	0.90	0.09	0.06
Hungary	0.12	0.64	1.23	0.36	4.83	0.40	6.49	3.04	0.46	2.13	23.82	0.17	0.06	0.03
Cyprus	0.06	0.00	0.00	0.00	0.02	0.00	0.01	0.02	0.00	0.01	0.00	18.72	0.00	0.00
Australia	0.05	0.12	0.01	0.01	0.02	0.04	0.00	0.03	0.02	0.01	0.01	0.04	64.33	0.18
Chile	0.00	0.51	0.00	0.01	0.00	0.01	0.00	0.00	0.08	0.00	0.00	0.01	0.19	57.69
Iceland	0.00	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Israel	1.90	0.48	0.08	0.13	0.24	0.06	0.04	0.31	0.17	0.10	0.17	7.44	0.13	0.14
Japan	4.38	4.64	0.81	0.45	0.46	0.63	0.75	0.40	0.51	1.08	1.82	1.98	3.66	1.86
Canada	0.84	0.55	0.10	0.10	0.09	0.14	0.10	0.16	0.08	0.06	0.28	0.18	0.33	0.49
Mexico	0.01	0.41	0.04	0.09	0.15	0.03	0.03	0.05	0.09	0.09	0.59	0.06	0.14	2.05
New Zealand	0.02	0.03	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.79	0.03
Norway	0.11	0.74	0.26	0.13	0.24	1.48	0.03	0.06	0.12	0.14	0.07	0.42	0.05	0.12
Switzerland	0.56	1.47	0.74	0.92	1.04	0.66	0.75	1.53	1.02	1.06	1.11	0.57	0.57	0.25
South Korea	25.60	0.91	1.52	0.73	0.60	0.35	7.08	5.16	0.30	1.04	1.92	5.50	1.42	2.28
Turkey	3.25	0.65	0.57	0.47	3.21	0.42	0.63	2.25	0.61	0.47	0.53	4.97	0.07	0.13
U.S.A.	0.82	7.30	0.72	0.64	0.66	1.73	0.32	0.87	1.14	0.86	1.50	0.80	5.20	9.35
Bosnia and Herzegovina	0.01	0.02	0.02	0.01	0.05	0.01	0.07	1.50	0.01	0.02	0.08	0.01	0.00	0.00
Brazil	0.03	1.16	0.09	0.35	0.06	0.08	0.04	0.07	0.18	0.02	0.11	0.03	0.09	2.97
China	22.91	15.82	4.01	2.72	3.99	2.63	3.70	7.20	3.22	4.65	7.28	9.51	7.65	11.06
Hong Kong	0.24	1.59	0.28	0.25	0.39	0.45	0.30	0.27	0.34	0.47	1.41	0.22	1.20	0.53
India	1.07	0.96	0.23	0.48	0.39	0.28	0.13	0.85	0.42	0.16	0.31	0.36	0.43	0.57
Iran	0.32	0.06	0.00	0.01	0.02	0.01	0.00	0.19	0.01	0.00	0.00	0.00	0.00	0.00
Croatia	0.58	0.05	0.04	0.01	0.12	0.02	0.14	3.13	0.01	0.07	0.15	0.25	0.00	0.00
Malaysia	0.32	1.26	0.11	0.07	0.07	0.13	0.15	0.11	0.07	0.22	0.30	0.23	0.91	0.11
Russian Federation	0.82	2.24	0.51	0.04	0.30	0.17	0.63	0.36	0.05	0.50	0.57	4.06	0.02	0.02
Saudi Arabia	0.09	0.20	0.09	0.12	0.02	0.05	0.01	0.09	0.09	0.01	0.00	0.06	0.05	0.06
Serbia	0.01	0.03	0.05	0.01	0.42	0.02	0.29	1.65	0.01	0.09	0.21	0.37	0.00	0.00
Singapore	1.30	1.73	0.10	0.08	0.09	0.10	0.08	0.16	0.06	0.48	0.73	0.08	1.53	0.05
South Africa	0.05	0.29	0.09	0.06	0.03	0.07	0.00	0.09	0.09	0.08	0.09	0.04	0.18	0.08
Taiwan	0.50	1.23	0.27	0.24	0.16	0.27	0.44	0.79	0.21	0.34	0.59	0.32	0.74	0.40
Thailand	0.18	0.99	0.16	0.15	0.13	0.21	0.23	0.12	0.13	0.61	0.42	0.22	1.72	0.54
Ukraine	0.07	0.08	0.49	0.02	0.72	0.02	0.43	0.04	0.03	0.16	1.03	0.55	0.01	0.01
United Arab Emirates	0.84	0.14	0.02	0.03	0.06	0.01	0.00	0.02	0.02	0.02	0.02	0.34	0.06	0.04
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Single export weights	0.02	1.54	2.93	0.29	1.57	1.21	1.84	1.51	1.76	3.55	2.64	0.10	0.63	0.13

Source: OeNB, WIFO.

Table A2 (continued)

Competition matrix for manufactured goods exports

Competing countries	Destinations													
	Iceland	Israel	Japan	Canada	Mexico	New Zealand	Norway	Switzerland	South Korea	Turkey	U.S.A.	Bosnia and Herzegovina	Brazil	China
	Market shares in %, calculated for the period from 2010 to 2012													
Belgium	2.30	3.49	0.15	0.36	0.28	0.47	1.30	2.23	0.12	1.22	0.45	0.96	0.31	0.08
Bulgaria	0.02	0.05	0.00	0.00	0.00	0.01	0.02	0.07	0.00	0.28	0.00	0.71	0.00	0.00
Denmark	9.06	0.15	0.03	0.12	0.07	0.24	3.47	0.32	0.04	0.12	0.10	0.23	0.06	0.02
Germany	10.78	5.14	0.72	1.51	2.23	2.17	6.82	20.93	1.22	5.90	1.97	15.63	1.51	0.83
Estonia	0.33	0.02	0.00	0.00	0.01	0.00	0.30	0.01	0.00	0.01	0.01	0.01	0.01	0.00
Finland	0.98	0.15	0.03	0.07	0.06	0.15	1.30	0.27	0.06	0.22	0.08	0.05	0.08	0.03
France	1.65	1.67	0.26	0.43	0.53	0.83	1.14	5.40	0.36	2.08	0.55	1.65	0.53	0.16
Greece	0.06	0.19	0.00	0.01	0.01	0.03	0.02	0.05	0.00	0.17	0.01	0.45	0.00	0.00
United Kingdom	5.48	2.65	0.24	0.77	0.29	1.38	2.94	3.49	0.25	1.09	0.94	0.56	0.35	0.11
Ireland	0.47	0.65	0.09	0.12	0.15	0.18	0.18	2.30	0.03	0.14	0.53	0.29	0.04	0.02
Italy	2.95	2.96	0.21	0.42	0.78	0.85	1.12	7.82	0.30	2.59	0.54	11.07	0.61	0.12
Latvia	0.34	0.02	0.00	0.00	0.00	0.00	0.16	0.02	0.00	0.01	0.00	0.01	0.00	0.00
Lithuania	0.52	0.01	0.00	0.01	0.00	0.00	0.33	0.02	0.00	0.01	0.01	0.02	0.00	0.00
Luxembourg	0.05	0.02	0.00	0.02	0.02	0.01	0.05	0.07	0.00	0.04	0.01	0.02	0.00	0.00
Malta	0.09	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Netherlands	9.39	1.79	0.11	0.19	0.21	0.36	2.24	2.05	0.32	1.18	0.30	1.41	0.19	0.06
Poland	1.00	0.35	0.02	0.12	0.08	0.10	2.06	0.60	0.03	0.66	0.06	2.11	0.04	0.02
Portugal	0.19	0.12	0.01	0.02	0.06	0.02	0.08	0.18	0.01	0.08	0.03	0.06	0.04	0.00
Romania	0.04	0.14	0.00	0.02	0.01	0.01	0.34	0.13	0.02	0.56	0.02	1.44	0.02	0.00
Sweden	6.19	0.46	0.07	0.20	0.17	0.28	9.71	0.58	0.10	0.41	0.19	0.63	0.18	0.05
Slovakia	0.23	0.08	0.00	0.03	0.02	0.03	0.13	0.35	0.01	0.27	0.03	1.23	0.01	0.02
Slovenia	0.08	0.05	0.00	0.01	0.01	0.01	0.04	0.12	0.00	0.07	0.01	10.80	0.01	0.00
Spain	0.68	1.37	0.06	0.16	0.76	0.26	0.67	1.50	0.06	1.28	0.14	1.46	0.31	0.03
Czech Republic	0.89	0.81	0.02	0.03	0.08	0.09	0.55	1.03	0.03	0.34	0.06	2.40	0.04	0.01
Hungary	0.21	0.44	0.02	0.04	0.09	0.08	0.15	0.35	0.02	0.38	0.04	4.08	0.03	0.02
Cyprus	0.01	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.04	0.00	0.00
Australia	0.09	0.12	0.09	0.06	0.07	10.68	0.02	0.14	0.18	0.03	0.09	0.01	0.02	0.04
Chile	0.43	0.00	0.02	0.08	0.20	0.05	0.02	0.08	0.19	0.09	0.09	0.00	0.31	0.12
Iceland	22.94	0.00	0.00	0.00	0.00	0.00	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Israel	0.14	39.06	0.03	0.12	0.08	0.14	0.04	0.50	0.06	0.35	0.38	0.03	0.10	0.03
Japan	1.47	2.10	86.91	1.45	2.18	3.33	0.88	1.02	4.71	0.67	2.53	0.01	0.64	1.47
Canada	0.68	0.35	0.06	51.04	0.74	0.50	0.35	0.22	0.09	0.08	3.58	0.02	0.22	0.04
Mexico	0.01	0.11	0.05	1.34	48.60	0.12	0.03	0.19	0.04	0.04	4.20	0.01	0.50	0.02
New Zealand	0.02	0.01	0.04	0.02	0.01	58.26	0.01	0.00	0.02	0.00	0.02	0.00	0.00	0.00
Norway	7.12	0.03	0.03	0.03	0.01	0.03	55.94	0.12	0.14	0.06	0.05	0.04	0.04	0.02
Switzerland	0.69	1.13	0.25	0.46	0.29	0.42	0.59	36.03	0.20	0.48	0.45	1.08	0.25	0.09
South Korea	4.11	1.79	0.96	0.71	2.01	1.36	1.08	0.27	79.21	1.11	1.06	0.31	0.99	1.24
Turkey	0.29	2.49	0.01	0.08	0.03	0.09	0.25	0.30	0.01	68.91	0.08	3.97	0.08	0.01
U.S.A.	2.72	14.06	1.50	34.31	31.82	3.62	1.53	4.31	2.30	1.14	71.14	0.24	3.02	0.59
Bosnia and Herzegovina	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	13.44	0.00	0.00
Brazil	0.01	0.13	0.06	0.10	0.81	0.05	0.04	0.29	0.09	0.10	0.28	0.03	84.87	0.03
China	2.57	7.57	4.73	3.83	4.99	6.69	2.25	1.44	6.09	3.57	6.45	0.74	3.17	90.55
Hong Kong	0.33	2.10	0.65	0.48	0.45	1.04	0.24	1.23	0.61	0.21	0.89	0.09	0.21	2.32
India	1.53	2.43	0.08	0.23	0.25	0.42	0.16	0.36	0.16	0.59	0.53	0.08	0.24	0.08
Iran	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.24	0.00	0.00	0.00	0.03
Croatia	0.04	0.01	0.00	0.00	0.00	0.01	0.07	0.04	0.00	0.03	0.01	9.85	0.00	0.00
Malaysia	0.05	0.00	0.41	0.14	0.34	0.91	0.07	0.08	0.31	0.15	0.35	0.02	0.08	0.21
Russian Federation	0.21	0.79	0.07	0.03	0.09	0.01	0.27	1.11	0.10	1.17	0.10	0.33	0.18	0.04
Saudi Arabia	0.02	0.00	0.02	0.00	0.01	0.35	0.03	0.06	0.08	0.45	0.02	0.08	0.01	0.09
Serbia	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.02	0.00	11.67	0.00	0.00
Singapore	0.05	0.67	0.57	0.19	0.35	1.87	0.26	0.34	1.15	0.10	0.44	0.03	0.14	0.35
South Africa	0.02	0.52	0.19	0.05	0.04	0.13	0.03	0.93	0.06	0.06	0.14	0.00	0.06	0.02
Taiwan	0.18	0.68	0.63	0.35	0.35	0.68	0.27	0.18	0.93	0.38	0.67	0.02	0.20	0.83
Thailand	0.06	0.73	0.61	0.13	0.28	1.53	0.16	0.43	0.21	0.22	0.34	0.09	0.19	0.18
Ukraine	0.19	0.28	0.00	0.01	0.05	0.01	0.05	0.02	0.03	0.56	0.02	0.43	0.04	0.00
United Arab Emirates	0.05	0.00	0.01	0.05	0.01	0.13	0.19	0.34	0.01	0.11	0.03	0.02	0.05	0.01
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Single export weights	0.02	0.21	1.04	0.78	0.43	0.07	0.43	5.02	0.74	0.99	5.56	0.27	0.89	2.73

Source: OeNB, WIFO.

Table A2 (continued)

Competition matrix for manufactured goods exports

Competing countries	Destinations															
	Hong Kong	India	Iran	Croatia	Malaysia	Russian Federation	Saudi Arabia	Serbia	Singapore	South Africa	Taiwan	Thailand	Ukraine	United Arab Emirates	Rest of the world	Double export weight
	Market shares in %, calculated for the period from 2010 to 2012															
Belgium	0.58	0.89	0.26	0.84	0.18	0.61	0.84	1.12	0.40	1.00	0.23	0.32	0.84	1.48	1.37	2.63
Bulgaria	0.01	0.00	0.03	0.23	0.01	0.07	0.05	2.32	0.01	0.01	0.01	0.01	0.15	0.02	0.13	0.41
Denmark	0.05	0.03	0.07	0.39	0.04	0.13	0.16	0.40	0.24	0.13	0.04	0.06	0.24	0.16	0.43	0.59
Germany	1.32	1.12	2.25	9.79	1.99	4.93	4.65	10.28	2.92	6.15	2.01	1.23	6.67	5.80	8.63	23.95
Estonia	0.00	0.00	0.00	0.02	0.00	0.26	0.00	0.02	0.00	0.01	0.00	0.00	0.13	0.00	0.03	0.06
Finland	0.03	0.06	0.04	0.32	0.07	0.71	0.17	0.22	0.12	0.27	0.06	0.06	0.46	0.21	0.49	0.61
France	1.09	0.32	1.10	1.53	0.89	1.11	2.22	1.70	2.25	1.41	0.52	0.56	1.06	2.28	3.78	5.96
Greece	0.01	0.00	0.01	0.15	0.00	0.04	0.05	1.01	0.02	0.02	0.00	0.00	0.06	0.14	0.18	0.32
United Kingdom	1.31	0.52	0.17	0.80	0.68	0.80	2.21	0.81	1.93	2.47	0.36	0.60	0.75	3.73	1.84	3.16
Ireland	0.16	0.02	0.04	0.18	0.20	0.05	0.34	0.36	0.26	0.19	0.06	0.05	0.06	0.21	0.17	0.69
Italy	1.00	0.38	1.42	8.14	0.39	1.39	2.29	7.96	0.75	1.08	0.33	0.44	2.11	3.02	3.65	7.20
Latvia	0.00	0.00	0.00	0.02	0.00	0.09	0.00	0.02	0.00	0.00	0.00	0.00	0.11	0.01	0.04	0.07
Lithuania	0.00	0.01	0.00	0.05	0.00	0.38	0.01	0.09	0.00	0.00	0.00	0.00	0.27	0.01	0.16	0.11
Luxembourg	0.02	0.01	0.01	0.02	0.00	0.02	0.03	0.04	0.02	0.03	0.00	0.00	0.02	0.05	0.04	0.15
Malta	0.07	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.11	0.00	0.00	0.00	0.00	0.01	0.02	0.02
Netherlands	0.25	0.16	0.34	1.49	0.27	0.78	0.98	1.67	0.92	1.13	0.78	0.27	1.23	1.30	1.52	2.73
Poland	0.05	0.03	0.05	1.13	0.06	0.87	0.10	1.87	0.17	0.28	0.04	0.04	4.15	0.16	0.59	2.95
Portugal	0.02	0.01	0.02	0.07	0.01	0.02	0.07	0.04	0.03	0.06	0.01	0.01	0.03	0.06	0.44	0.42
Romania	0.02	0.02	0.14	0.35	0.01	0.15	0.08	2.67	0.02	0.09	0.00	0.00	0.56	0.12	0.29	1.05
Sweden	0.12	0.14	0.38	0.61	0.17	0.40	0.65	0.71	0.39	0.68	0.12	0.20	0.39	0.33	0.71	1.42
Slovakia	0.01	0.01	0.01	0.94	0.01	0.36	0.03	2.18	0.01	0.05	0.01	0.01	0.55	0.06	0.35	1.20
Slovenia	0.01	0.01	0.03	4.83	0.00	0.12	0.02	4.64	0.01	0.02	0.01	0.01	0.28	0.04	0.21	0.44
Spain	0.17	0.13	0.41	0.82	0.12	0.29	0.84	0.81	0.27	0.59	0.11	0.12	0.36	0.71	1.91	2.44
Czech Republic	0.07	0.07	0.04	1.52	0.04	0.59	0.15	1.84	0.06	0.28	0.03	0.04	1.41	0.32	0.67	2.91
Hungary	0.05	0.03	0.01	2.90	0.06	0.38	0.11	4.15	0.23	0.41	0.02	0.04	2.08	0.76	0.44	1.66
Cyprus	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02
Australia	0.25	0.07	0.02	0.00	0.64	0.01	0.53	0.01	0.52	0.38	0.44	0.48	0.01	0.32	0.52	0.49
Chile	0.01	0.01	0.00	0.00	0.05	0.00	0.04	0.06	0.00	0.05	0.43	0.04	0.00	0.01	0.46	0.15
Iceland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Israel	0.92	0.25	0.00	0.09	0.27	0.08	0.00	0.07	0.21	0.24	0.19	0.16	0.18	0.01	0.42	0.28
Japan	6.44	0.85	0.88	0.14	5.73	1.31	4.07	0.12	6.82	2.37	12.13	10.79	0.59	4.35	6.92	2.49
Canada	0.19	0.12	0.04	0.16	0.21	0.11	0.37	0.04	0.27	0.24	0.16	0.12	0.11	0.38	0.53	0.78
Mexico	0.07	0.03	0.00	0.01	0.04	0.03	0.07	0.00	0.21	0.12	0.07	0.07	0.04	0.16	1.32	0.65
New Zealand	0.03	0.01	0.00	0.00	0.03	0.00	0.02	0.00	0.05	0.03	0.02	0.02	0.00	0.03	0.08	0.06
Norway	0.02	0.02	0.02	0.17	0.06	0.04	0.04	0.05	0.38	0.06	0.05	0.02	0.02	0.15	0.18	0.42
Switzerland	1.54	0.25	0.35	0.79	0.24	0.34	0.96	0.98	1.21	0.44	0.45	0.35	0.48	1.51	1.24	3.07
South Korea	4.92	0.98	3.37	0.32	2.00	1.14	3.94	0.19	5.01	1.09	3.58	2.07	1.03	3.54	5.97	1.79
Turkey	0.05	0.03	1.77	0.82	0.03	0.55	1.38	2.94	0.14	0.18	0.02	0.04	1.33	1.40	2.26	1.40
U.S.A.	4.33	1.30	0.06	0.52	3.80	0.73	7.06	0.46	7.98	2.97	4.91	2.06	0.87	6.17	8.40	6.68
Bosnia and Herzegovina	0.00	0.00	0.00	1.72	0.00	0.00	0.00	1.17	0.00	0.00	0.00	0.00	0.01	0.00	0.05	0.11
Brazil	0.08	0.06	0.06	0.01	0.06	0.02	0.18	0.02	0.43	0.57	0.13	0.16	0.06	0.16	2.76	1.04
China	50.34	4.08	7.48	5.40	9.47	4.36	8.31	2.05	12.65	7.63	8.36	7.09	7.12	14.25	19.69	7.80
Hong Kong	3.97	0.95	0.09	0.14	1.24	0.22	0.38	0.15	2.59	0.45	2.51	1.52	0.21	1.95	1.65	0.76
India	2.16	82.91	0.76	0.31	0.76	0.17	1.58	0.21	1.90	1.61	0.21	0.63	0.42	14.26	2.78	1.14
Iran	0.00	0.14	68.53	0.01	0.03	0.00	0.03	0.00	0.02	0.01	0.08	0.02	0.02	1.13	0.50	0.23
Croatia	0.00	0.00	0.01	50.00	0.00	0.04	0.01	1.89	0.00	0.02	0.00	0.00	0.05	0.02	0.12	0.60
Malaysia	1.83	0.37	0.22	0.04	54.54	0.06	0.53	0.03	7.33	0.36	1.03	2.53	0.07	1.91	1.22	0.48
Russian Federation	0.09	0.38	1.29	0.36	0.10	74.23	0.14	1.52	0.04	0.04	0.38	0.16	8.78	0.27	1.26	2.46
Saudi Arabia	0.12	0.24	0.09	0.21	0.10	0.02	48.74	0.04	1.24	0.34	0.43	0.28	0.10	1.56	0.64	0.32
Serbia	0.00	0.00	0.02	1.08	0.00	0.07	0.00	40.51	0.00	0.00	0.00	0.00	0.11	0.00	0.10	0.31
Singapore	6.47	0.89	0.15	0.12	10.31	0.05	0.43	0.03	32.06	0.40	3.41	3.78	0.02	2.07	3.78	0.69
South Africa	0.14	0.07	0.03	0.01	0.10	0.01	0.10	0.01	0.09	62.44	0.14	0.08	0.02	0.31	1.59	0.54
Taiwan	6.74	0.32	0.45	0.18	2.05	0.17	0.66	0.04	4.94	0.47	55.29	1.66	0.18	0.83	1.73	0.67
Thailand	2.34	0.39	0.29	0.06	2.83	0.10	1.23	0.02	2.36	0.94	0.73	61.60	0.12	1.45	2.51	0.53
Ukraine	0.00	0.08	0.29	0.13	0.04	1.53	0.13	0.35	0.06	0.01	0.02	0.08	53.95	0.15	0.85	0.54
United Arab Emirates	0.50	1.22	6.90	0.02	0.07	0.05	3.00	0.03	0.33	0.18	0.04	0.12	0.11	20.66	2.35	0.30
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Single export weights	0.53	0.66	0.27	0.93	0.29	2.65	0.47	0.45	0.33	0.47	0.30	0.24	0.60	0.49	3.79	100.00

Source: OeNB, WIFO.

Table A3

Comparison of weights for manufactured goods across different calculation periods

Competing countries	1998 to 2000				2001 to 2003				2004 to 2006			
	Austrian exports (single weights)	Austrian exports (double weights)	Austrian imports	Total	Austrian exports (single weights)	Austrian exports (double weights)	Austrian imports	Total	Austrian exports (single weights)	Austrian exports (double weights)	Austrian imports	Total
	%											
Belgium	1.82	2.77	2.21	2.48	1.72	2.88	1.89	2.38	1.73	2.96	1.71	2.35
Bulgaria	0.34	0.19	0.11	0.15	0.38	0.20	0.17	0.18	0.52	0.28	0.28	0.28
Denmark	0.86	0.80	0.64	0.72	0.77	0.76	0.59	0.68	0.74	0.69	0.55	0.63
Germany	36.82	29.95	43.28	36.86	33.43	27.23	42.28	34.85	31.93	25.25	43.07	33.89
Estonia	0.05	0.04	0.03	0.03	0.08	0.06	0.03	0.04	0.18	0.09	0.03	0.06
Finland	0.62	0.91	1.12	1.02	0.59	0.86	1.11	0.99	0.58	0.81	1.06	0.93
France	4.75	6.61	5.22	5.89	4.69	6.52	4.23	5.36	4.12	5.87	4.17	5.04
Greece	0.45	0.34	0.15	0.24	0.59	0.41	0.13	0.27	0.52	0.38	0.12	0.25
United Kingdom	4.71	5.47	3.37	4.38	4.95	5.16	2.67	3.90	4.43	4.51	2.28	3.43
Ireland	0.32	0.82	0.75	0.78	0.31	0.90	1.27	1.08	0.48	0.80	0.86	0.83
Italy	6.85	8.74	7.80	8.25	6.93	8.83	7.22	8.02	7.15	8.60	7.07	7.85
Latvia	0.06	0.03	0.02	0.03	0.10	0.05	0.03	0.04	0.13	0.07	0.02	0.05
Lithuania	0.08	0.06	0.04	0.05	0.11	0.09	0.04	0.06	0.15	0.12	0.04	0.08
Luxembourg	0.20	0.18	0.17	0.18	0.19	0.18	0.17	0.17	0.23	0.19	0.23	0.21
Malta	0.02	0.02	0.01	0.02	0.02	0.02	0.01	0.02	0.11	0.02	0.01	0.02
Netherlands	2.45	2.40	2.95	2.68	2.26	2.46	2.78	2.62	1.83	2.52	2.74	2.62
Poland	1.69	1.61	0.76	1.17	1.80	1.82	0.96	1.39	2.24	2.21	1.12	1.68
Portugal	0.49	0.58	0.56	0.57	0.50	0.57	0.61	0.59	0.45	0.48	0.49	0.48
Romania	0.68	0.50	0.42	0.46	1.24	0.69	0.74	0.72	1.79	0.96	0.94	0.95
Sweden	1.22	1.58	1.49	1.53	1.12	1.44	1.42	1.43	1.10	1.42	1.46	1.44
Slovakia	1.11	0.78	1.07	0.93	1.45	0.90	1.46	1.18	1.67	1.00	1.46	1.22
Slovenia	1.68	0.93	1.00	0.97	1.74	0.98	1.19	1.09	1.79	0.89	1.19	1.04
Spain	3.06	3.15	1.41	2.25	2.87	3.15	1.53	2.33	2.99	3.15	1.57	2.38
Czech Republic	2.78	2.14	2.13	2.14	3.12	2.39	2.72	2.56	3.22	2.63	3.11	2.86
Hungary	4.93	2.50	3.02	2.77	4.46	2.22	3.24	2.74	3.62	1.93	2.38	2.15
Cyprus	0.05	0.02	0.00	0.01	0.09	0.02	0.00	0.01	0.04	0.01	0.01	0.01
Australia	0.50	0.41	0.03	0.22	0.54	0.44	0.05	0.24	0.67	0.52	0.07	0.30
Chile	0.05	0.07	0.01	0.04	0.05	0.07	0.01	0.04	0.08	0.11	0.01	0.06
Iceland	0.03	0.03	0.02	0.02	0.02	0.02	0.01	0.02	0.04	0.03	0.00	0.02
Israel	0.23	0.29	0.15	0.22	0.17	0.26	0.12	0.19	0.13	0.23	0.09	0.16
Japan	1.03	3.14	2.97	3.05	1.02	2.88	2.66	2.77	1.07	2.87	2.52	2.70
Canada	0.76	0.68	0.55	0.61	0.85	0.78	0.47	0.62	1.00	0.91	0.43	0.68
Mexico	0.23	0.41	0.14	0.27	0.21	0.44	0.19	0.31	0.24	0.49	0.16	0.33
New Zealand	0.07	0.05	0.01	0.03	0.08	0.06	0.01	0.04	0.09	0.07	0.02	0.05
Norway	0.47	0.44	0.15	0.29	0.40	0.40	0.12	0.26	0.42	0.41	0.18	0.30
Switzerland	6.24	3.68	3.39	3.53	6.04	3.34	3.61	3.47	5.26	2.72	3.69	3.19
South Korea	0.34	0.96	0.51	0.73	0.41	1.12	0.73	0.92	0.49	1.44	1.02	1.24
Turkey	0.78	0.94	0.54	0.73	0.73	1.01	0.78	0.89	0.86	1.23	0.88	1.06
U.S.A.	4.93	7.32	6.86	7.08	5.71	7.67	6.72	7.19	6.28	7.63	5.60	6.65
Bosnia and Herzegovina	–	–	–	–	0.21	0.10	0.04	0.07	0.24	0.12	0.12	0.12
Brazil	0.42	0.55	0.13	0.33	0.31	0.46	0.10	0.28	0.30	0.58	0.18	0.39
China	0.74	1.71	1.66	1.68	1.41	2.99	2.26	2.62	1.42	4.27	3.65	3.97
Hong Kong	0.57	0.88	0.34	0.60	0.70	0.88	0.34	0.61	0.52	0.83	0.21	0.53
India	0.17	0.38	0.24	0.30	0.22	0.48	0.27	0.37	0.37	0.67	0.34	0.51
Iran	0.32	0.30	0.03	0.16	0.37	0.30	0.02	0.16	0.37	0.27	0.02	0.14
Croatia	0.98	0.51	0.34	0.42	1.26	0.62	0.50	0.56	1.35	0.66	0.65	0.65
Malaysia	0.13	0.35	0.31	0.33	0.13	0.37	0.62	0.50	0.25	0.43	0.33	0.38
Russian Federation	0.92	1.03	0.29	0.64	1.45	1.35	0.28	0.81	2.08	1.95	0.27	1.13
Saudi Arabia	0.27	0.17	0.01	0.09	0.25	0.18	0.01	0.10	0.36	0.26	0.01	0.14
Serbia	–	–	–	–	–	–	–	–	0.17	0.16	0.05	0.11
Singapore	0.28	0.54	0.20	0.37	0.29	0.61	0.27	0.44	0.27	0.75	0.17	0.47
South Africa	0.38	0.41	0.07	0.23	0.47	0.50	0.07	0.28	0.56	0.59	0.10	0.35
Taiwan	0.37	0.90	0.94	0.92	0.31	0.84	0.82	0.83	0.33	0.78	0.70	0.74
Thailand	0.20	0.31	0.26	0.28	0.15	0.35	0.28	0.32	0.15	0.39	0.37	0.38
Ukraine	0.29	0.32	0.12	0.22	0.41	0.43	0.17	0.30	0.55	0.54	0.20	0.37
United Arab Emirates	0.22	0.10	0.01	0.05	0.32	0.23	0.01	0.12	0.34	0.24	0.03	0.14
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: OeNB, WIFO.

Table A3 (continued)

Comparison of weights for manufactured goods across different calculation periods

Competing countries	2007 to 2009				2010 to 2012			
	Austrian exports (single weights)	Austrian exports (double weights)	Austrian imports	Total	Austrian exports (single weights)	Austrian exports (double weights)	Austrian imports	Total
	%							
Belgium	1.67	3.04	1.79	2.43	1.59	2.63	1.81	2.24
Bulgaria	0.68	0.38	0.29	0.34	0.56	0.41	0.35	0.38
Denmark	0.73	0.70	0.48	0.59	0.59	0.59	0.45	0.52
Germany	31.65	23.97	42.72	33.00	32.06	23.95	41.11	32.19
Estonia	0.11	0.07	0.03	0.05	0.09	0.06	0.03	0.05
Finland	0.57	0.79	0.60	0.70	0.46	0.61	0.49	0.55
France	4.07	5.59	3.59	4.63	4.87	5.96	3.32	4.69
Greece	0.58	0.41	0.10	0.26	0.38	0.32	0.10	0.22
United Kingdom	3.57	3.57	2.16	2.89	3.27	3.16	1.83	2.52
Ireland	0.26	0.69	0.54	0.62	0.27	0.69	0.55	0.63
Italy	6.80	8.23	7.08	7.67	5.99	7.20	6.70	6.96
Latvia	0.15	0.07	0.02	0.05	0.11	0.07	0.02	0.04
Lithuania	0.14	0.13	0.05	0.09	0.14	0.11	0.05	0.08
Luxembourg	0.13	0.16	0.17	0.17	0.15	0.15	0.24	0.19
Malta	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.01
Netherlands	1.78	2.64	2.72	2.68	1.60	2.73	2.71	2.72
Poland	2.86	2.61	1.35	2.00	3.04	2.95	1.63	2.32
Portugal	0.41	0.46	0.37	0.42	0.31	0.42	0.45	0.44
Romania	2.04	1.15	0.72	0.95	1.64	1.05	0.93	0.99
Sweden	1.21	1.44	1.44	1.44	1.26	1.42	1.31	1.37
Slovakia	1.87	1.13	1.64	1.38	1.91	1.20	1.93	1.55
Slovenia	1.90	0.84	1.10	0.96	1.57	0.44	1.11	0.76
Spain	2.73	2.99	1.63	2.33	1.83	2.44	1.73	2.10
Czech Republic	3.63	2.86	3.31	3.08	3.69	2.91	3.58	3.23
Hungary	3.25	1.85	2.21	2.02	2.74	1.66	2.44	2.03
Cyprus	0.06	0.01	0.02	0.02	0.10	0.02	0.04	0.03
Australia	0.70	0.51	0.06	0.29	0.66	0.49	0.04	0.28
Chile	0.10	0.13	0.01	0.07	0.14	0.15	0.05	0.10
Iceland	0.03	0.03	0.01	0.02	0.02	0.02	0.01	0.02
Israel	0.18	0.26	0.09	0.18	0.22	0.28	0.17	0.23
Japan	0.82	2.57	2.05	2.32	1.08	2.49	1.95	2.23
Canada	0.85	0.78	0.45	0.62	0.81	0.78	0.34	0.57
Mexico	0.35	0.56	0.19	0.38	0.44	0.65	0.23	0.45
New Zealand	0.08	0.07	0.03	0.05	0.07	0.06	0.03	0.05
Norway	0.60	0.50	0.19	0.35	0.45	0.42	0.19	0.31
Switzerland	5.01	2.55	4.25	3.37	5.22	3.07	4.47	3.74
South Korea	0.54	1.68	0.65	1.19	0.77	1.79	0.63	1.24
Turkey	0.83	1.35	0.86	1.11	1.03	1.40	0.90	1.16
U.S.A.	5.04	6.82	6.11	6.48	5.78	6.68	5.56	6.14
Bosnia and Herzegovina	0.30	0.14	0.19	0.17	0.28	0.11	0.27	0.18
Brazil	0.64	0.88	0.18	0.55	0.93	1.04	0.16	0.61
China	1.96	6.16	4.99	5.60	2.84	7.80	6.47	7.16
Hong Kong	0.41	0.81	0.15	0.50	0.55	0.76	0.11	0.45
India	0.59	0.96	0.43	0.71	0.69	1.14	0.53	0.84
Iran	0.34	0.25	0.01	0.13	0.28	0.23	0.02	0.13
Croatia	1.34	0.63	0.61	0.62	0.97	0.60	0.57	0.59
Malaysia	0.28	0.42	0.25	0.34	0.30	0.48	0.30	0.39
Russian Federation	2.65	2.22	0.31	1.30	2.76	2.46	0.38	1.46
Saudi Arabia	0.47	0.22	0.02	0.12	0.48	0.32	0.03	0.18
Serbia	0.53	0.32	0.22	0.27	0.47	0.31	0.21	0.26
Singapore	0.32	0.72	0.13	0.43	0.34	0.69	0.14	0.43
South Africa	0.53	0.57	0.10	0.34	0.49	0.54	0.08	0.32
Taiwan	0.23	0.70	0.63	0.66	0.31	0.67	0.57	0.62
Thailand	0.18	0.48	0.41	0.45	0.25	0.53	0.39	0.46
Ukraine	0.72	0.62	0.21	0.42	0.63	0.54	0.20	0.38
United Arab Emirates	0.52	0.31	0.02	0.17	0.51	0.30	0.08	0.19
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: OeNB, WIFO.

Table A4

Variable list

Definition	Label	Growth rate (mean)
NA: Total exports, nominal	na_xn	5.72
NA: Exports of goods, nominal	na_xgn	5.96
NA: Exports of services, nominal	na_xsn	5.29
NA: Total imports, nominal	na_mn	5.16
NA: Imports of goods, nominal	na_mgn	5.13
NA: Imports of services, nominal	na_msn	5.42
NA: Austrian GDP, nominal	yn_a	3.36
NA: Total exports, real with irregular component	na_x	4.75
NA: Exports of goods, real with irregular component	na_xg	5.21
NA: Exports of services, real with irregular component	na_xs	3.71
NA: Total imports, real with irregular component	na_m	3.84
NA: Imports of goods, real with irregular component	na_mg	4.16
NA: Imports of services, real with irregular component	na_ms	2.87
NA: Austrian GDP, real with irregular component	y_a	1.79
World GDP, nominal	yn_world	4.59
World GDP, real	y_world	3.77
Exchange rate	e_usea	–0.24
CA: Exports of goods	ca_xgn	6.09
CA: Exports of general merchandise	ca_xcn	6.14
CA: Exports of general services	ca_xsn	5.65
CA: Exports of tourism in broader sense	ca_xten	2.64
CA: Exports of tourism in narrower sense	ca_xtnn	2.53
CA: Exports of international passenger transport	ca_xptn	5.10
CA: Imports of goods	ca_mgn	5.33
CA: Imports of general merchandise	ca_mcn	5.36
CA: Imports of general services	ca_msn	5.59
CA: Imports of tourism in broader sense	ca_mten	3.21
CA: Imports of tourism in narrower sense	ca_mtnn	2.95
CA: Imports of international passenger transport	ca_mptn	6.46
Nominal effective exchange rate, total	e_tn	0.38
Nominal effective exchange rate, goods	e_gn	0.36
Nominal effective exchange rate, food	e_fn	0.55
Nominal effective exchange rate, raw materials	e_rn	1.05
Nominal effective exchange rate, industrial goods	e_in	0.26
Nominal effective exchange rate, services	e_sn	0.47
Real effective exchange rate, total	e_t	–0.45
Real effective exchange rate, goods	e_g	–0.46
Real effective exchange rate, food	e_f	–0.47
Real effective exchange rate, raw materials	e_r	–0.64
Real effective exchange rate, industrial goods	e_i	–0.46
Real effective exchange rate, services	e_s	–0.52
Nominal effective exchange rate, total ULC	e_tulcn	–0.13
Nominal effective exchange rate, services ULC	e_sulcn	–0.18
Real effective exchange rate, total ULC	e_tulc	–0.30
Real effective exchange rate, services ULC	e_sulc	–0.46
Nominal effective exchange rate, total PPI	e_ippin	–0.21
Real effective exchange rate, total PPI	e_ippi	–0.62

Source: OeNB, Statistics Austria, authors' calculations. Quarterly data rates of change against previous year based on data from Q1 96 to Q2 16. NA: national accounts, CA: current account, ULC: unit labor costs, PPI: producer price index.

Table A5

Correlation between pairs of trade flow variables (rate of change with respect to the previous year's quarter)

	NA_X	NA_XG	NA_XS	CA_XGN	CA_XCN	CA_XSN	CA_XTEN	CA_XTNN	CA_XPTN
NA_X	1.00								
NA_XG	0.97	1.00							
NA_XS	0.58	0.38	1.00						
CA_XGN	0.96	0.95	0.54	1.00					
CA_XCN	0.97	0.96	0.53	1.00	1.00				
CA_XSN	0.54	0.41	0.84	0.50	0.50	1.00			
CA_XTEN	0.28	0.15	0.55	0.26	0.27	0.64	1.00		
CA_XTNN	0.13	0.01	0.48	0.04	0.05	0.55	0.99	1.00	
CA_XPTN	0.60	0.62	0.22	0.68	0.66	0.35	0.43	0.31	1.00

Source: OeNB, Statistics Austria. Authors' calculations based on pairwise maximum samples. Compare table A4 for a definition of labels.

Table A6

Correlation between pairs of real effective exchange rate indices (rate of change the with respect to the previous year's quarter)

	E_T	E_G	E_F	E_R	E_I	E_S	E_TULC	E_SULC	E_IPPI
E_T	1.00								
E_G	1.00	1.00							
E_F	0.95	0.95	1.00						
E_R	0.86	0.87	0.87	1.00					
E_I	0.99	1.00	0.93	0.83	1.00				
E_S	0.98	0.97	0.98	0.89	0.96	1.00			
E_TULC	0.86	0.85	0.84	0.81	0.85	0.88	1.00		
E_SULC	0.85	0.83	0.85	0.81	0.83	0.88	0.99	1.00	
E_IPPI	0.74	0.74	0.78	0.64	0.73	0.78	0.75	0.76	1.00

Source: OeNB, Statistics Austria. Authors' calculations based on pairwise maximum samples. Compare table A4 for a definition of labels.

Notes

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

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German | quarterly

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