

# MONETARY POLICY & THE ECONOMY

Quarterly Review of Economic Policy

Monetary Policy & the Economy provides analyses and studies on central banking and economic policy topics and is published at quarterly intervals.

**Publisher and editor**

Oesterreichische Nationalbank  
Otto-Wagner-Platz 3, 1090 Vienna, Austria  
PO Box 61, 1011 Vienna, Austria  
www.oenb.at  
oenb.info@oenb.at  
Phone: (+43-1) 40420-6666  
Fax: (+43-1) 40420-046698

**Editorial board**

Ernest Gnan, Doris Ritzberger-Grünwald,  
Helene Schuberth, Martin Summer

**Managing editor**

Anita Roitner

**Editing**

Rita Glaser-Schwarz, Barbara Meinx, Anita Roitner, Ingeborg Schuch

**Translations**

Dagmar Dichtl, Ingrid Haussteiner, Barbara Meinx, Ingeborg Schuch, Susanne Steinacher

**Layout and typesetting**

Sylvia Dalcher, Andreas Kullerschitz

**Design**

Information Management and Services Division

**Printing and production**

Oesterreichische Nationalbank, 1090 Vienna

DVR 0031577

ISSN 2309–3323 (online)

© Oesterreichische Nationalbank, 2019. All rights reserved.

May be reproduced for noncommercial, educational and scientific purposes provided that the source is acknowledged.

Printed according to the Austrian Ecolabel guideline for printed matter.

Please collect used paper for recycling.

EU Ecolabel: AT/028/024



# Contents

Call for applications: Klaus Liebscher Economic Research Scholarship	4
Nontechnical summaries in English and German	5

## Analyses

Modest economic downturn in Austria on the back of a slowing global economy <i>Gerhard Fenz, Friedrich Fritzer, Ernst Glatzer, Martin Schneider</i>	12
Equity ratios of Austrian nonfinancial corporations – evidence from balance sheet data <i>Christian Beer, Walter Waschiczek</i>	25
Challenges for measuring inflation in a digital world from a monetary policy perspective <i>Doris Ritzberger-Grünwald, Fabio Rumler</i>	42
Exploring supply and demand-driven imbalances in Austria’s housing market <i>Martin Schneider</i>	54
European Economic and Monetary Union: The first and the next 20 years Key findings from the OeNB’s 46 <sup>th</sup> Economics Conference in 2019, organized in cooperation with SUERF <i>Morten Balling, Ernest Gnan, Philipp Warum</i>	72

*Opinions expressed by the authors of studies do not necessarily reflect the official viewpoint of the Oesterreichische Nationalbank or of the Eurosystem.*

# Call for applications: Klaus Liebscher Economic Research Scholarship

The Oesterreichische Nationalbank (OeNB) invites applications for the “Klaus Liebscher Economic Research Scholarship.” This scholarship program gives outstanding researchers the opportunity to contribute their expertise to the research activities of the OeNB’s Economic Analysis and Research Department. This contribution will take the form of remunerated consultancy services.

The scholarship program targets Austrian and international experts with a proven research record in economics and finance, and postdoctoral research experience. Applicants need to be in active employment and should be interested in broadening their research experience and expanding their personal research networks. Given the OeNB’s strategic research focus on Central, Eastern and Southeastern Europe, the analysis of economic developments in this region will be a key field of research in this context.

The OeNB offers a stimulating and professional research environment in close proximity to the policymaking process. The selected scholarship recipients will be expected to collaborate with the OeNB’s research staff on a prespecified topic and are invited to participate actively in the department’s internal seminars and other research activities. Their research output may be published in one of the department’s publication outlets or as an OeNB Working Paper. As a rule, the consultancy services under the scholarship will be provided over a period of two to three months. As far as possible, an adequate accommodation for the stay in Vienna will be provided.

Applicants must provide the following documents and information:

- a letter of motivation, including an indication of the time period envisaged for the consultancy
- a detailed consultancy proposal
- a description of current research topics and activities
- an academic curriculum vitae
- an up-to-date list of publications (or an extract therefrom)
- the names of two references that the OeNB may contact to obtain further information about the applicant
- evidence of basic income during the term of the scholarship (employment contract with the applicant’s home institution)
- written confirmation by the home institution that the provision of consultancy services by the applicant is not in violation of the applicant’s employment contract with the home institution

Please e-mail applications to [scholarship@oenb.at](mailto:scholarship@oenb.at) by the end of October 2020. Applicants will be notified of the jury’s decision by end-November.

Nontechnical summaries  
in English and German

## Nontechnical summaries

### Equity ratios of Austrian nonfinancial corporations – evidence from balance sheet data

*Christian Beer, Walter Waschiczek*

Equity fulfills very specific tasks within the financing mix of a company. Due to its long-term nature and its risk-bearing capacity, it is particularly important for financing long-term and risky investment projects, especially in areas such as start-ups or innovations. The economic literature has identified a large number of aspects that affect the capital structure of firms, that is, the relative shares of debt and equity within total financing. This article provides a cross-sectional analysis of the equity ratio of Austrian nonfinancial companies for 2016, using an extensive database based on the SABINA database combined with master data from the OeNB. Overall, the analysis covers 130,967 firms.

The median value of the equity ratio of all firms in our sample is 34%. However, there is a very high degree of heterogeneity. As much as 20% of the enterprises have a negative equity ratio, whereas 0.1% have an equity ratio of more than 100% (implying negative debt). The equity ratio varies considerably across industries. The median equity ratio is only 14% for accommodation services but 50% for professional activities and even 71% in the case of head offices.

Relating a range of firm characteristics to the equity ratio, we address in particular two questions: For one, we look at the relationship between technology intensity and the equity ratio. As the data do not allow measuring the technology intensity of firms directly, we employ a sectoral classification proposed by Eurostat. We find low-tech companies to have a lower equity ratio than companies with higher technology intensity. This pattern is more pronounced in the service sector than in manufacturing. However, the median equity ratio of high-tech manufactures does not differ significantly from the median equity ratio of medium-low-technology manufacturers. Start-ups exhibit a higher equity ratio than young companies outside the high-tech sector. Another factor with an impact on the equity ratio is the degree of technology use, defined as the share of tangible assets in total assets. Specifically, industries with a high tangible assets ratio have a low equity ratio.

The second issue of the paper concerns the relationship between firm size and equity ratio. Here we find that the equity ratio decreases with firm size (measured by total assets) up to a certain point. Minimum capital requirements may contribute somewhat to the higher equity ratio of micro enterprises. Furthermore, public information available about a firm may play a role, given evidence of a strong relationship between firm size and the amount of information available about a firm, measured by the number of balance sheet items in the company register (from where the SABINA data are taken). Firms about which there is less information available have significantly higher equity ratios. The direction of this relationship is not clear, however. Unavailability of information may be a hindrance to raising outside equity, or it may be the deliberate choice of firms, when the additional cost of providing information to outsiders outweighs the additional benefit of outside equity capital. Firm age – which is also related to firm size, as older firms are on average larger than younger ones – affects the equity ratio only in the first decade of company life. Here, the share of tangible assets may play a role, as the tangible assets ratio reaches a minimum at about that age.

The findings of this paper have to be assessed against the background of the policy measures to foster equity financing that Austria has implemented in recent years, especially for young and innovative enterprises and regarding venture capital financing. These measures can be expected to enable firms to increase their equity ratio via outside financing further, although it will take time for these initiatives to show their full effect. Moreover, surveys show that Austrian firms currently consider access to finance to be a relatively small problem, as they mostly rely on internal financing and very low-interest debt. In the same vein, especially younger firms require not only (equity) finance but also other forms of support. Thus, the role of venture capital goes beyond its financing function but also extends to monitoring activities and the provision of expertise and management support. This supporting function, which is a key aspect of venture capital financing especially in the early stages of funding, e.g. in the start-up and expansion stage of companies, cannot be increased easily by policy measures.

## Challenges for measuring inflation in a digital world from a monetary policy perspective

*Doris Ritzberger-Grünwald, Fabio Rumler*

The digitalization in the retail industry, in particular the rise of e-commerce, in the past 10–15 years has not only revolutionized the industry but also poses a number of new challenges to the measurement of inflation. We discuss possible effects of the growing use of the Internet in retail shopping on prices, inflation and official price statistics and provide a few ideas for the improvement of inflation measurement in that respect.

In recent years, e-commerce gained significant importance in all euro area countries. In Austria, for instance, the share of consumers ordering goods and services online has doubled within the last 10 years to more than 60% of all consumers. The empirical literature finds some evidence that the growing importance of e-commerce has had a dampening effect on prices of products sold online but also on offline prices. However, this effect is likely to be small and only temporary until the spread of the internet will have reached its limit.

To account for the changing consumption habits resulting from the rise in e-commerce, the methods and procedures for inflation measurement have to be adjusted to the new conditions. To this end, in addition to monitoring prices at brick-and-mortar stores, national statistical institutes should collect prices from online retailers (through so called web scraping) to the extent that online sales account for the total turnover of retailers. Furthermore, the use of scanner data from retailers in official inflation statistics would allow for a joint analysis of prices and quantities sold, which would help to reduce the substitution bias present in conventional price statistics and to improve the representativeness of the price index.

Another long-standing issue that remains to be solved in inflation measurement is the treatment of housing costs of apartment and house owners (owner-occupied housing). Although these costs account for a considerable share of the total cost of living of households, they are still not included in the harmonized index of consumer prices (HICP) due to the incompatibility of the available approaches to calculate/estimate the costs of owner-occupied housing with the legal framework of the HICP and also because there is no agreement even among experts which of the available approaches is most appropriate. In this respect, experimental evidence indicates that – under circumstances of normal house price developments – including owner-occupied housing in official price statistics will most likely not change inflation numbers in most euro area countries by much.

## Exploring supply and demand-driven imbalances in Austria's housing market

*Martin Schneider*

This article explores supply and demand imbalances in Austria's housing market over time. Data on housing supply and demand are key indicators for the real estate market, providing information on whether the market may be heading toward excess demand and hence a housing shortage or whether housing production exceeds demand, thus possibly creating more housing vacancies. For the purposes of our analysis, we look at the development of housing demand, which is mainly driven by the number of households. We also look at demand for secondary residences, changes in vacancy rates and the net loss of housing. In the 1990s and 2000s, demand for housing was mainly driven by declining household sizes. Since 2012, net migration has been the most important determinant of demand. In 2016, demand for housing peaked at 75,300 homes and has since decreased considerably, dropping to 48,600 homes in 2019. Looking ahead, housing demand is expected to continue its sharp decline to 36,300 homes in 2030.

The annual increase in housing supply is based on the number of newly completed homes. Following weak completion growth in the 1980s, the following decade saw a rapid acceleration of construction activity. From 1991 to 2000, the number of newly completed homes totaled 47,800 per year on average. Thereafter, construction activity bottomed out in 2004 with 36,500 new homes being completed. Since 2011, construction activity has gradually picked up again, resulting in 57,400 new homes being completed in 2017. Based on building permit growth, this figure is projected to increase further to 67,000 completions in 2019, before declining to 63,000 in 2020.

The level of excess demand that arises over time can be calculated on the basis of supply and demand developments. In the period under review, which starts in 1980, excess demand for housing emerged in the early 1990s and peaked in 1993, when annual demand exceeded the number of available housing units by 41,000. A construction boom in the late 1990s tipped the market back toward excess supply, which rose to 27,000 homes until 1998. By 2016, a combination of shrinking household sizes, rising net migration and weak construction activity had created another peak in excess housing demand, with demand exceeding supply by 65,000 homes. Since 2017, Austria's housing market has been easing again. Increased construction activity and weaker demand are expected to eliminate excess demand across the country by 2020.

# Nontechnical summaries in German

## Eigenkapitalausstattung nichtfinanzieller Unternehmen in Österreich – eine Bilanzdatenanalyse

*Christian Beer, Walter Waschiczek*

Eigenkapital kommt in der Unternehmensfinanzierung eine besondere Bedeutung zu. Aufgrund der fehlenden Rückzahlungsverpflichtungen und der hohen Risikotragfähigkeit spielt Eigenkapital speziell bei der Finanzierung langfristiger und risikoreicher Investitionsprojekte eine wichtige Rolle, insbesondere im Fall von Start-Ups oder Unternehmensinnovationen. Die Kapitalstruktur von Unternehmen – also das Verhältnis zwischen Fremd- und Eigenkapital – wird der einschlägigen Literatur zufolge von zahlreichen Faktoren beeinflusst. Der vorliegende Artikel zur Eigenkapitalausstattung österreichischer Unternehmen nimmt – basierend auf Daten aus der SABINA-Datenbank und OeNB-Stammdaten von 130.967 Unternehmen für das Jahr 2016 – eine umfangreiche Querschnittsanalyse vor.

Demnach lag die mittlere Eigenkapitalquote (gemessen am Median) aller untersuchten Unternehmen 2016 bei 34%, wobei die Bandbreite sehr groß war. 20% der Unternehmen verzeichneten sogar eine negative Eigenkapitalquote, es gab aber auch Unternehmen (0,1%) mit einer Eigenkapitalquote von über 100%. Auch branchenweise gehen die Werte deutlich auseinander. So lag der Median im Beherbergungs- und Gastronomiesektor bei nur 14%, verglichen mit 50% bei freiberuflichen, wissenschaftlichen und technischen Dienstleistern und 71% bei Holdings.

Die vorliegende Studie setzt verschiedene Unternehmenskennzahlen in Beziehung zur Eigenkapitalquote und thematisiert vor allem zwei Fragen. Zum einen geht es um den Zusammenhang zwischen Technologieintensität und Eigenkapitalquote. Da die Technologieintensität von Unternehmen mit den vorliegenden Daten nicht direkt gemessen werden kann, stützt sich die Studie auf die Systematik der Wirtschaftszweige gemäß Eurostat. Generell fällt bei einem niedrigem Technisierungsgrad auch die Eigenkapitalquote vergleichsweise niedrig aus, wobei dieses Verhältnis im Dienstleistungssektor stärker ausgeprägt ist als in der Sachgüterproduktion. Innerhalb der Sachgüterproduktion ist bei der mittleren Eigenkapitalausstattung zwischen High-Tech-Betrieben und Betrieben mit mittlerem bis niedrigem Technisierungsgrad kein signifikanter Unterschied festzustellen. Start-ups haben vergleichsweise mehr Eigenkapital als junge Unternehmen außerhalb des High-Tech-Sektors. Schließlich gibt es einen Zusammenhang zwischen dem Technisierungsgrad (gemessen am Sachanlageanteil an der Bilanzsumme) und der Eigenkapitalquote. Konkret haben Branchen mit einem hohen Anteil von Sachanlagen einen niedrigen Eigenkapitalanteil.

Die zweite Frage betrifft den Zusammenhang zwischen Unternehmensgröße und Eigenkapitalausstattung. Hier zeigen die Ergebnisse der Studie, dass die Eigenkapitalquote mit zunehmender Unternehmensgröße (gemessen anhand der Bilanzsumme) zunächst sinkt. Die vergleichsweise höhere Eigenkapitalquote von Kleinstunternehmen könnte zumindest teilweise an gesetzlichen Mindesteigenkapitalanforderungen liegen. Ferner dürfte auch der öffentliche Zugang zu Unternehmensdaten eine Rolle spielen: Der Studie zufolge besteht ein starker Zusammenhang zwischen der Unternehmensgröße und den insgesamt öffentlich zugänglichen Unternehmensdaten (gemessen an der Anzahl der Bilanzpositionen im Firmenbuch, auf dem auch die SABINA-Daten beruhen). Unternehmen, für die weniger Informationen öffentlich sind, haben eine signifikant höhere Eigenkapitalquote. Die Richtung dieser Beziehung ist allerdings nicht eindeutig. Einerseits könnte eine geringere Verfügbarkeit von Informationen die Fremdkapitalbeschaffung erschweren. Andererseits könnte ein Unternehmen lieber weniger Firmendaten veröffentlichen als zusätzliche potenzielle Eigenkapitalgeber anzusprechen. Schließlich beeinflusst das Alter eines Unternehmens – das auch mit der Unternehmensgröße zusammenhängt, da ältere Unternehmen durchschnittlich größer sind als jüngere – die Eigenkapitalquote nur in den ersten zehn Jahren nach Firmengründung. Hier könnte die Ausstattung mit Sachanlagevermögen relevant sein, da die Sachanlagenquote nach etwa zehn Jahren ihren niedrigsten Wert erreicht.

Die Ergebnisse der vorliegenden Studie sind vor dem Hintergrund der wirtschaftspolitischen Maßnahmen der letzten Jahre zu betrachten, die die Eigenfinanzierung (insbesondere von jungen und innovativen Unternehmen und hinsichtlich der Risikokapitalfinanzierung) in Österreich attraktiver machen sollten. Es ist zu erwarten, dass Firmen dank dieser Maßnahmen mehr Eigenkapital im Rahmen der Außenfinanzierung aufnehmen werden können, wobei der volle Effekt erst mit der Zeit zum Tragen kommen dürfte. Des Weiteren zeigen Umfragen, dass der Zugang zu Finanzierungsmitteln von den österreichischen Unternehmen derzeit als relativ unproblematisch angesehen wird, da sie ihren Kapitalbedarf überwiegend mit eigenen Mitteln bzw. mit derzeit sehr niedrig verzinsten Krediten decken. Auch und insbesondere junge Unternehmen brauchen jedoch nicht nur entsprechende (Eigenkapital-)Finanzierungsmöglichkeiten, sondern auch andere Formen der Unterstützung. So beschränkt sich die Rolle der Risikokapitalgeber nicht rein auf die Kapitalbereitstellung – sie stellen auch ihre Expertise zur Verfügung, begleiten Unternehmensprozesse und unterstützen Unternehmensentscheidungen. Die diesbezügliche Unterstützung, die insbesondere in der entscheidenden Anfangs- und Wachstumsphase einen wesentlichen Aspekt der Wagniskapitalfinanzierung darstellt, lässt sich nicht ohne weiteres durch wirtschaftspolitische Maßnahmen steigern.



## Inflationsmessung im digitalen Zeitalter: Herausforderungen aus geldpolitischer Sicht

*Doris Ritzberger-Grünwald, Fabio Rumler*

Die Digitalisierung bzw. die Möglichkeit via Internet einzukaufen (e-commerce) haben die Handelsbranche in den letzten 10 bis 15 Jahren grundlegend verändert. Dies bringt auch neue Herausforderungen für die Inflationsmessung mit sich. Wir erörtern in der vorliegenden Studie mögliche Auswirkungen auf das Preisniveau, die Inflationsentwicklung sowie die amtliche Preisstatistik und geben einige Anstöße zur Optimierung der Inflationsmessung.

Das E-Commerce-Geschäft hat in den letzten Jahren in allen Euro-Ländern markant an Bedeutung gewonnen. So erwerben in Österreich inzwischen mehr als 60 % aller Verbraucher Güter und Dienstleistungen auch online, was einer Verdoppelung des Anteils an den Einkäufen insgesamt in den letzten 10 Jahren entspricht. Es gibt empirische Hinweise für eine preisdämpfende Wirkung des zunehmenden Online-Handels sowohl bei den online als auch bei im Geschäft verkauften Produkten. Dieser Effekt dürfte sich allerdings in Grenzen halten und wird zudem nur solange wirken, bis der Anteil des Online-Handels am gesamten Handel nicht mehr wächst.

Aufgrund der nachhaltigen Veränderungen beim Einkaufsverhalten der Konsumenten muss es auch zu methodischen Umstellungen bei der amtlichen Inflationsmessung kommen. Neben der auf den herkömmlichen Handel ausgerichteten Preisbeobachtung müssten die nationalen Statistikämter künftig auch Internet-Verkaufspreise im Ausmaß des Online-Handelsumsatzes erheben (durch sogenanntes Web-Scraping) und in die Inflationsmessung miteinbeziehen. Darüber hinaus würde die statistische Auswertung von Scannerdaten des Einzelhandels eine gemeinsame Analyse von Preis- und Umsatzentwicklungen ermöglichen. Damit ließe sich die Verzerrung herkömmlicher Preisstatistiken aufgrund häufiger Produktwechsel durch die Konsumenten (Substitution-Bias) verringern und die Repräsentativität des Preisindex erhöhen.

Ein weiteres noch zu lösendes Problem bei der Inflationsmessung ist die Behandlung der Kosten von selbst genutztem Wohnungseigentum. Obwohl ein beträchtlicher Anteil der monatlichen Ausgaben von Eigenheimbewohnern auf diese Kosten entfällt, werden sie bislang im Harmonisierten Verbraucherpreisindex (HVPI) nicht erfasst. Dies liegt zum einen daran, dass die derzeitigen Ansätze zur Berechnung/Schätzung der Wohnungseigentumskosten mit dem HVPI-Regelwerk inkompatibel sind. Zum anderen herrscht auch unter Experten keine Einigkeit darüber, welcher der verfügbaren Ansätze zur Einbeziehung der Wohnungseigentumskosten in den HVPI am geeignetsten ist. Experimentelle Analysen deuten diesbezüglich allerdings darauf hin, dass sich die Inflationswerte bei Berücksichtigung von selbst genutztem Wohnungseigentum in den meisten Euro-Ländern mit großer Wahrscheinlichkeit nicht maßgeblich ändern würden, zumindest solange sich die Wohnimmobilienpreise in einem normalen Rahmen bewegen.

## Nachfrage und Angebot am österreichischen Wohnimmobilienmarkt

*Martin Schneider*

In diesem Beitrag wird die Entwicklung der Wohnungsnachfrage und des Wohnungsangebots in Österreich analysiert. Diese beiden Größen zeigen, ob sich ein Nachfrageüberhang aufbaut, der zu Wohnungsmangel führt, oder ob der Wohnungsbau die Nachfrage übersteigt und damit möglicherweise eine Leerstandskrise droht. Die Entwicklung der Nachfrage wird im Wesentlichen von der Anzahl der Haushalte bestimmt. Darüber hinaus sind noch die Nachfrage nach Zweitwohnsitzen, die Veränderung des Leerstands und der Wohnungsabgang relevant. In den 1990er- und 2000er-Jahren wurde die Wohnungsnachfrage vor allem durch sinkende Haushaltsgrößen getrieben. Seit 2012 ist Nettomigration die wichtigste Nachfragekomponente. Die Wohnungsnachfrage erreichte im Jahr 2016 mit 75.300 Wohnungen ihren Höhepunkt. Seither hat sich die Nachfrage deutlich abgeschwächt und lag 2019 bei 48.600 Wohnungen. Bis zum Jahr 2030 wird mit einer weiteren deutlichen Abschwächung auf 36.300 Wohnungen gerechnet.

Das jährlich neu geschaffene Wohnungsangebot wird durch die Anzahl der Wohnungsfertigstellungen bestimmt. Nach einem schwachen Angebotswachstum in den 1980er-Jahren kam es im Zuge des Baubooms der 1990er-Jahre zu einer deutlichen Beschleunigung der Bauleistung: Im Zeitraum von 1991 bis 2000 betrug die Anzahl der Fertigstellungen durchschnittlich 47.800 Wohnungen pro Jahr. Bis 2004 nahm die Bauleistung auf 36.500 Wohnungen ab. Seit 2011 beschleunigt sich die Bauleistung sukzessive. Im Jahr 2017 wurden 57.400 Wohnungen errichtet. Eine Prognose auf Basis der Baubewilligungen zeigt bis zum Jahr 2019 einen weiteren Anstieg auf 67.000 fertiggestellte Wohnungen, bevor für das Jahr 2020 mit einem Rückgang auf 63.000 gerechnet wird.

Auf Basis der Entwicklung von Wohnungsnachfrage und -angebot kann der Nachfrageüberhang berechnet werden. In der ersten Hälfte der 1990er-Jahre ergab sich – ausgehend von einem Überangebot an Wohnungen – ein Nachfrageüberhang, der im Jahr 1993 mit 41.000 Wohnungen seinen Höhepunkt erreichte. In Folge des Baubooms in der zweiten Hälfte

der 1990er-Jahre drehte sich dieser in ein Überschussangebot von 27.000 Wohnungen im Jahr 1998. Bis zum Jahr 2016 hat das Zusammentreffen von sinkenden Haushaltsgrößen, steigender Nettomigration und schwacher Bauleistung zu einem Nachfrageüberhang von 65.000 Wohnungen geführt. Seit dem Jahr 2017 entspannt sich die Lage am österreichischen Wohnimmobilienmarkt wieder. Durch die stärkere Ausweitung der Bauleistung und die schwächere Nachfrage sollte der Nachfrageüberhang bis zum Jahr 2020 österreichweit abgebaut sein.

# Analyses

# Modest economic downturn in Austria on the back of a slowing global economy

Gerhard Fenz, Friedrich Fritzer, Ernst Glatzer, Martin Schneider<sup>1</sup>  
Cutoff date: September 13, 2019

Amid weakening global growth, economic activity in Austria has also been slowing down, albeit only moderately thanks to robust domestic demand. Based on the results of its Economic Indicator, the Oesterreichische Nationalbank (OeNB) expects real GDP to expand (quarter on quarter) by 0.2% in the third quarter and by 0.3% in the fourth quarter of 2019. This implies a downward revision of 0.2 percentage points from the OeNB's Economic Indicator of May 2019. Real GDP is, however, still expected to grow by 1.5% in 2019 as a whole, as real GDP data for the beginning of 2019 have been revised slightly upward.

In its most recent inflation forecast of September 2019, the OeNB anticipates HICP inflation to decline from 2.1% in 2018 to 1.6% in 2019, and to remain at this level in both 2020 and 2021. Compared with the OeNB's June 2019 outlook, this represents downward revisions of 0.1 percentage points for each of the years from 2019 to 2021. In 2019, the decline in inflation has been driven by lower energy price inflation, which is masking persistently high wage pressures and robust domestic demand, both of which are not expected to decrease before 2020. As a result, core inflation (excluding food and energy) is projected to reach 1.8% in 2019 and 2.0% in 2020, before dropping to 1.7% in 2021, given the cyclical downturn in Austria.

## 1 Economic activity has slowed in the first half of 2019

In recent months, Austria's economy has been facing strong headwinds stemming from the external economic environment. Political developments in the U.K. have significantly increased – at least temporarily – the likelihood of a no-deal Brexit, adding to higher levels of overall uncertainty. At the same time, the trade dispute between the U.S.A. and China has escalated further. In Europe, both the political (and economic) future of major EU countries such as Italy continue to be shrouded in uncertainty. And recently, concerns about prospective developments in Germany, Austria's main trading partner, have intensified as well. In fact, after having contracted in the second quarter of 2019, the German economy could – according to leading indicators – enter a technical recession (i.e. two successive quarters of negative growth).

In light of these developments, Austria's economy has proved to be resilient in the year to date. While the pace of growth slowed down in the first two quarters (+0.4% and +0.3%), it was still above the levels recorded for Germany and the euro area. However, since its peak in late 2017/early 2018, economic growth has weakened gradually, dipping below its average growth rate of the past 20 years (+0.42%).

In the second quarter of 2019, growth was supported by domestic demand, whose contribution came to 0.4 percentage points in that period. Posting an increase of 0.5%, private consumption continued to be an important driver of growth as well. At 0.5%, investment growth decelerated on the previous quarter (+0.8%) but remained above its long-term average of 0.4%. Investment growth was broad based, the only exception being nonresidential construction investment, which

<sup>1</sup> Oesterreichische Nationalbank, Economic Analysis Division, [gerhard.fenz@oenb.at](mailto:gerhard.fenz@oenb.at), [friedrich.fritzer@oenb.at](mailto:friedrich.fritzer@oenb.at), [ernst.glatzer@oenb.at](mailto:ernst.glatzer@oenb.at), [martin.schneider@oenb.at](mailto:martin.schneider@oenb.at).

Table 1

## National accounts data for Austria as on August 30, 2019

	GDP	Private consumption	Government consumption	Gross fixed capital formation	Exports	Imports	Domestic demand (excluding changes in inventories)	Net exports	Changes in inventories	Statistical discrepancy	
	Change on previous period in %						Contribution to GDP growth in percentage points				
Q3 18	+0.4	+0.2	+0.3	+0.8	+1.0	+0.7	0.4	0.2	-0.1	-0.0	
Q4 18	+0.5	+0.3	+0.3	+0.8	+0.8	+0.7	0.4	0.1	-0.0	-0.0	
Q1 19	+0.4	+0.5	+0.2	+0.8	+0.9	+0.7	0.5	0.1	-0.0	-0.2	
Q2 19	+0.3	+0.5	+0.3	+0.5	+0.5	+0.4	0.4	0.1	-0.1	0.0	
2016	+2.0	+1.4	+1.7	+4.2	+3.0	+4.0	2.1	-0.4	0.3	0.1	
2017	+2.7	+1.7	+1.4	+3.8	+4.6	+4.4	2.0	0.3	0.3	0.1	
2018	+2.7	+1.5	+0.4	+3.5	+4.4	+3.2	1.7	0.8	0.4	-0.2	

Source: WIFO, authors' calculations.

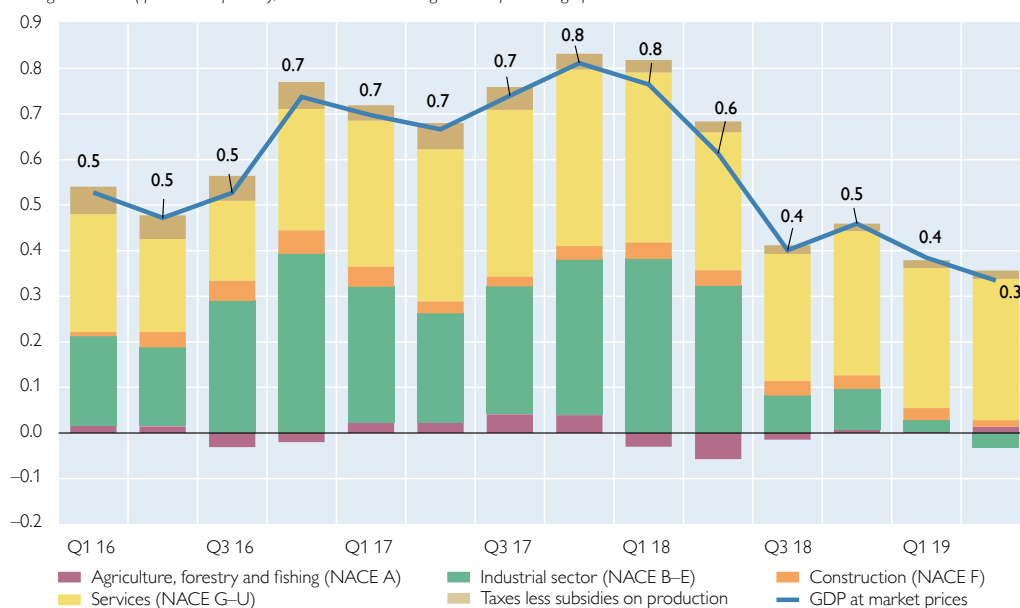
stagnated in the second quarter of 2019. By contrast, residential construction investment remained – in addition to private consumption – the key driver of domestic growth, increasing by as much as 0.8%.

Meanwhile, global headwinds have clearly taken their toll on Austria's industrial and export sectors. In the second quarter of 2019, export growth declined further to 0.5%, with net exports contributing only marginally (+0.1 percentage points) to real GDP growth. On the output side, the industrial sector's growth momentum had already decelerated substantially in the second half of 2018, and continued to do so in the first half of 2019. In the second quarter of 2019, the industrial sector's

Chart 1

## Contributions to GDP growth

GDP growth in % (quarter on quarter); contributions to GDP growth in percentage points



Source: WIFO.

contribution to growth turned negative for the first time, which meant that economic growth was almost entirely driven by the services sector.

Since the introduction of the European System of Accounts (ESA) 2010, the Austrian Institute of Economic Research (WIFO) releases two different sets of seasonally adjusted GDP series. For the second quarter of 2019, the seasonally and working day-adjusted GDP series, which fluctuates more sharply and is also published by Eurostat, indicates a quarter-on-quarter growth rate of 0.2% (Q1 19: +0.4%). It thus points to cyclical dynamics that are similar to those of the trend-cycle series, which exhibits a smoother trend and is used by WIFO and the OeNB.

## 2 Export growth continues to slow down

The current economic downturn in Austria was triggered by global developments. Since mid-2018, growth in both global trade and global industrial production has been decelerating substantially, which has caused Austria's external trade to lose considerable momentum as well. Thanks to well-filled order books, though, the downturn in Austria seems to have set in with some lag.

According to Statistics Austria, nominal goods exports still rose by 3.3% in the first six months of 2019, while exports to the euro area developed less dynamically, posting an increase of 2.2%. The latter is largely ascribable to the weak growth in exports to Germany (+0.1%) and Italy (+0.6%). Among Austria's top ten export destinations, exports to Hungary (+13.0%), to the U.K. (+10.4%) and to France (+7.5%) recorded the most pronounced growth rates. Conversely, the greatest decline was observed for exports to Turkey (-17.3%). Corresponding to a mere 0.9% in Austria's total exports, exports to Turkey only play a subordinate role for Austria's exporters. A breakdown by sectors shows that exports of fuel and energy (+21.9%), vehicles (+10.1%) and chemicals (+6.8%) picked up notably, whereas exports of manufactured goods contracted slightly (-1.2%).

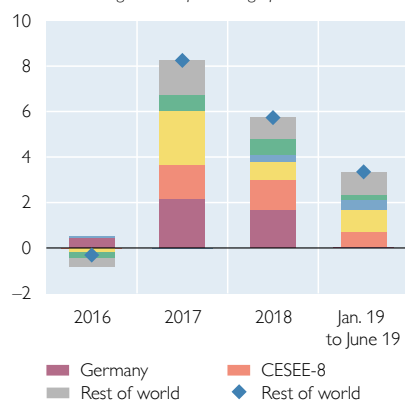
The most recent figures of the OeNB's Export Indicator, which is based on truck mileage data, indicate positive year-on-year growth rates, namely 4.0% for

Chart 2

### Growth composition of Austrian goods exports and imports by region

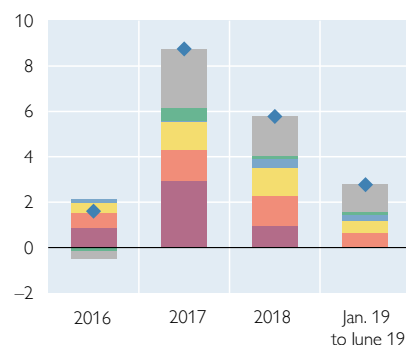
#### Exports

Annual change in % (in nominal terms); contribution to growth in percentage points



#### Imports

Annual change in %



Source: Statistics Austria.

Note: CESEE-8: Bulgaria, Czech Republic, Croatia, Hungary, Poland, Romania, Slovenia, Slovakia.

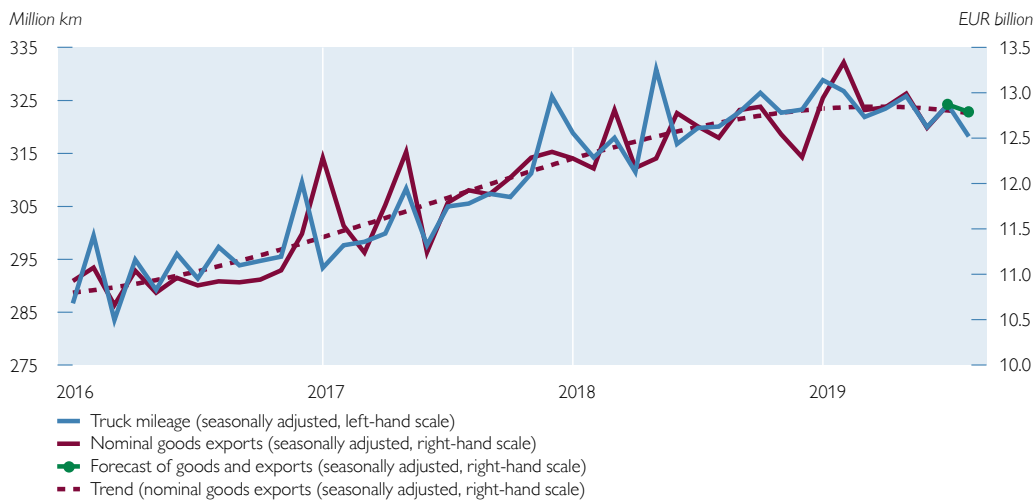
July and 0.2% for August. This increase is exclusively due to the dynamic development of exports in the second half of 2018 and in the first two months of 2019. Export volumes peaked in February 2019; since then, nominal goods exports, adjusted for seasonal and working day effects, have been decreasing somewhat (see dashed line in chart 3.1).

Looking ahead, survey data point to a further weakening in export activity over the next few months. According to the Bank Austria Purchasing Managers' Index (PMI), estimates for new export orders increased slightly in August 2019, but, at 47.3 points, remained below the expansion threshold of 50 points. By contrast,

Chart 3.1

### OeNB Export Indicator and leading indicators for external trade

#### Truck mileage and goods exports

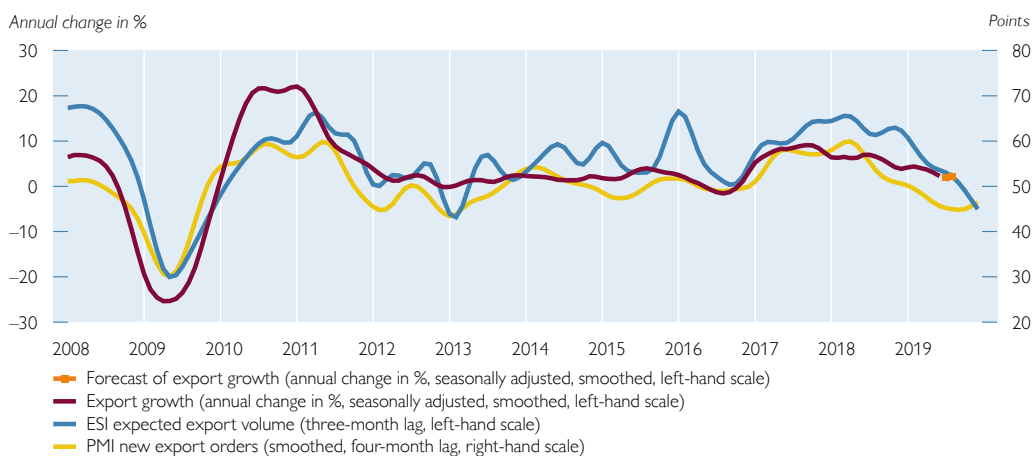


Source: Austrian highway authority (ASFINAG), OeNB.

Chart 3.2

### OeNB Export Indicator and leading indicators for external trade

#### Leading indicators for external trade



Source: Eurostat, Statistics Austria, Austrian highway authority (ASFINAG), Bank Austria, OeNB.

data on export expectations gathered by the European Commission suggest a steady decline in the months to come (see chart 3.2).

Growth of goods imports stood at 2.8% in the first six months of 2019 and thus lagged behind growth of goods exports. Goods imports from the most significant country of origin, Germany, which accounts for 36% of Austrian total imports, edged down by 0.1% and were therefore largely responsible for the subdued import growth.

Exports in the services sector expanded by 5.3% over the first six months of 2018, and thus grew much stronger than the goods sector. Tourism was once again the main driver of growth in the services sector. The number of overnight stays by visitors from abroad rose by 1.1% in the first seven months of 2019, reaching an all-time high of 71.6 million

The current account surplus declined by EUR 1.8 billion year on year in the first half of 2018, reaching EUR 4.4 billion, or 2.4% of GDP mainly due to a worsening of the goods balance. Amid higher commodity prices, the surplus in the goods balance decreased significantly by EUR 1.3 billion.

### 3 Industrial production growth turned negative in the second quarter of 2019

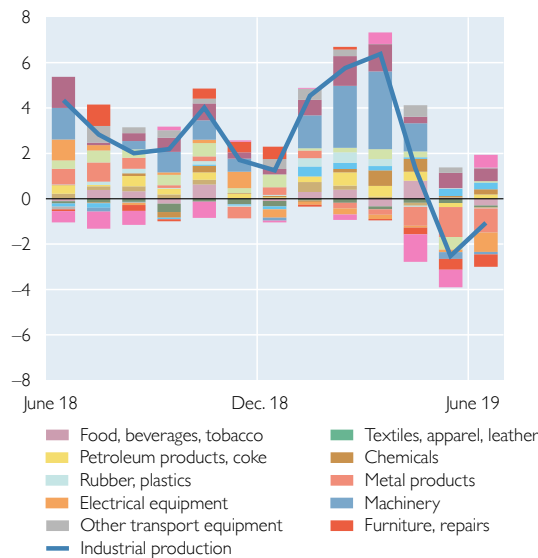
Leading indicators available for Austria's industry suggested early on that domestic industrial activity would moderate. According to the European Commission, industrial confidence has been below its long-term average since the end of the first quarter of 2019. Similarly, the Bank Austria Purchasing Managers' Index has been below the expansion threshold of 50 points since April, signaling that industrial production is expected to decline. In May, growth in industrial production turned negative (-2.5% year on year) and continued to contract also in June (-1.1%).

Chart 4

#### Contributions to industrial production growth by sector

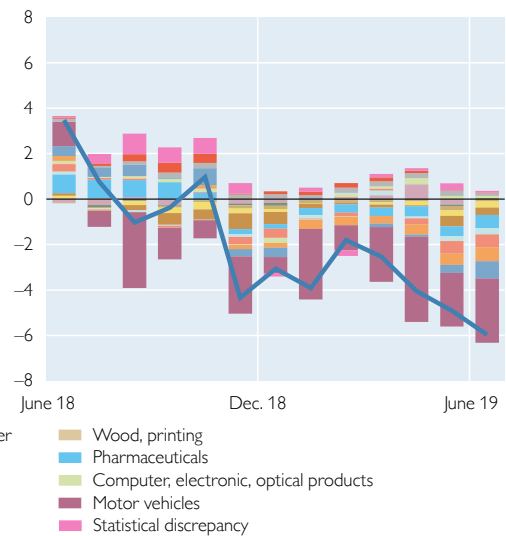
##### Austria

Annual change in %, contributions to growth in percentage points



##### Germany

Annual change in %, contributions to growth in percentage points



Source: Eurostat.

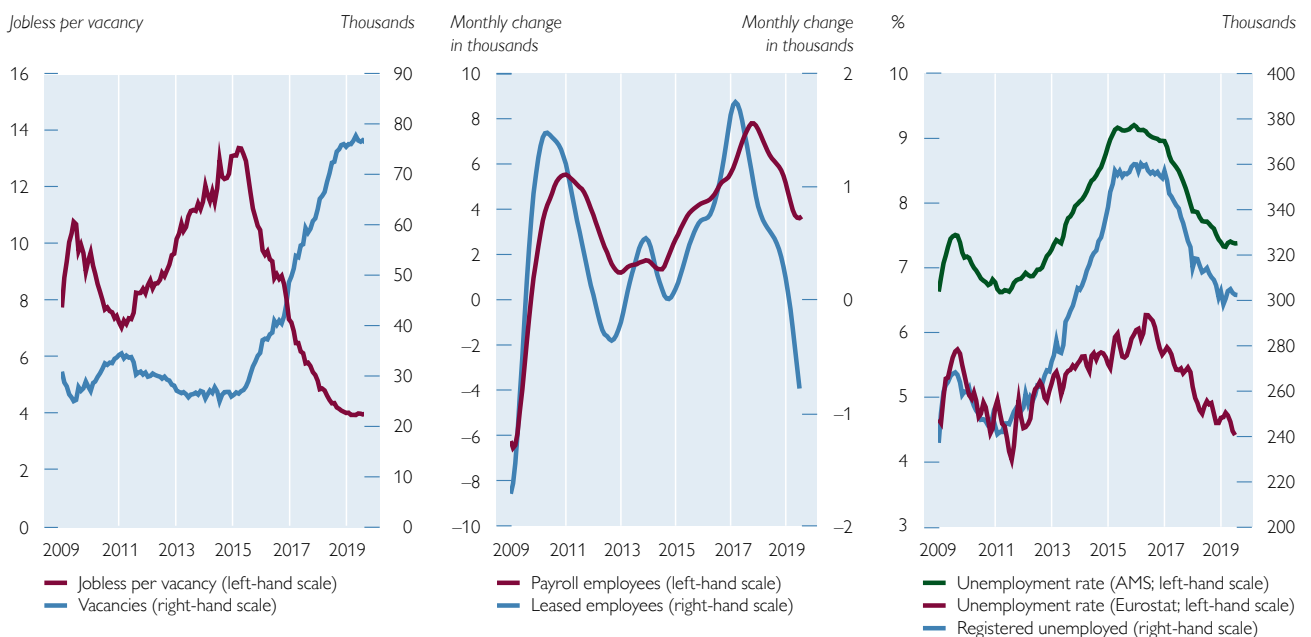


This brought a long-lasting boom period of Austria’s industry to an end. From 2015 to 2018, industrial production increased by at least 2% per year, with growth averaging as much as 3.5% in that period. In late 2018 and early 2019, developments in Austria’s industrial sector continued to be astonishingly resilient, so that average production growth equaled 4.5% in the first quarter of 2019. Looking at the sectoral composition, growth was broad based, with the machinery and automotive industries being major pillars of growth. As a result, Austria’s industry for quite some time bucked the downward trend observable for Germany’s industry. In Germany, adverse spillovers from its struggling automotive industry triggered a recession in the country’s industrial sector, which has gradually deepened since September 2018. Austria’s industrial sector, on the contrary, benefited from growth stimuli coming from Central, Eastern and Southeastern European (CESEE) countries as well as from order backlogs accumulated during the boom years, which had not yet been depleted.

As remarkable as Austria’s decoupling from developments in Germany may have been in recent months, Austria’s industry has not been able to escape contagion after all. However, even though Austria’s industrial production in mid-2019 dropped for the first time during the current cycle, industrial activity declined significantly less in Austria (–1.1% in June 2019) than in Germany, where output plunged by 6%. Besides the developments in Germany, the CESEE countries’ growth prospects have deteriorated recently, and the outlook for global trade has remained subdued. In view of this difficult global environment, Austria’s export-oriented industry is facing challenging conditions in the second half of 2019.

Chart 5

**Labor market indicators for Austria**



Source: Public Employment Service Austria (AMS), Main Association of Austrian Social Security Institutions (HSV), Eurostat.  
 Note: All data are seasonally adjusted.

#### 4 Austria's labor market responds with a lag to economic downturn

So far, Austria's labor market still appears to have been largely unaffected by the cooling economy. In August 2019, payroll employment rose by almost 60.000 persons year on year. The Austrian unemployment rate (national definition) ran to 7.4% in August 2019, while unemployment calculated according to the Eurostat definition stood at 4.4%, which represented a decline of 0.3 and 0.5 percentage points (year on year), respectively.

However, the growth rates observed in the year to date indicate that on the labor market, too, the cyclical peak has been passed. Since the beginning of 2019, there has been scarcely any increase in the number of vacancies, and the number of job seekers per position has stopped declining. Moreover, the number of persons registered as unemployed at the Public Employment Service Austria (AMS) has stagnated at around 300,000 (seasonally adjusted) since the turn of the year. Likewise, the seasonally adjusted unemployment rate (national definition) has remained at 7.4% since January 2019. By contrast, the unemployment rate published by Eurostat has decreased by 0.3 percentage points since early 2019; yet, Eurostat's latest unemployment figures have often been prone to revision in the past. Recently, employment

Chart 6

#### Confidence indicators for the Austrian economy

**Economic Sentiment Indicator (ESI)**



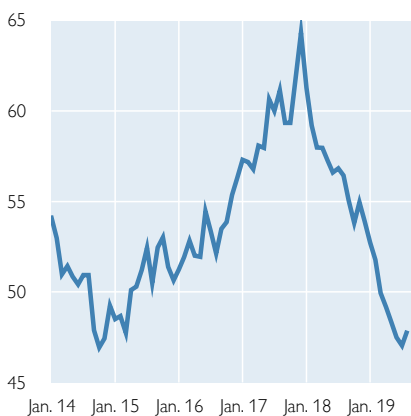
**ESI: industrial confidence**



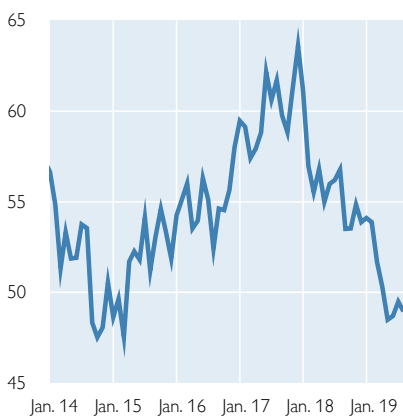
**ESI: export order books**



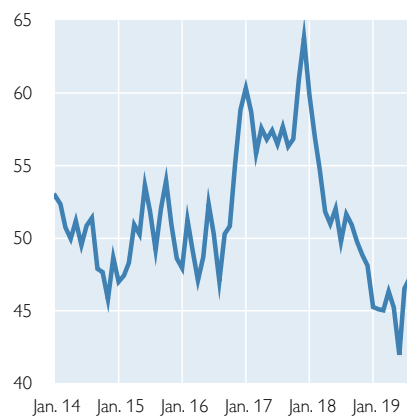
**Purchasing Managers' Index (PMI)**



**PMI: new orders**



**PMI: new export orders**



Source: European Commission, Bank Austria.

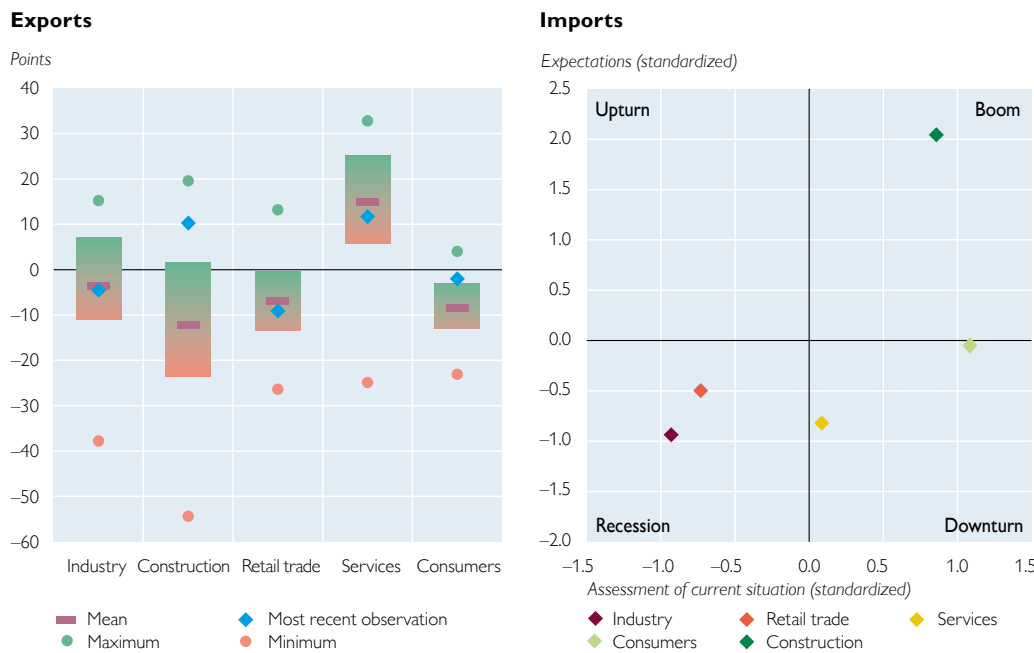
growth has also slowed markedly, even if seasonally adjusted values for August 2019 continue to point to a month-on-month increase in the number of payroll employees. The number of leased employees, a reliable leading indicator for the entire labor market, has in turn been declining since March 2019 already. This signals more muted developments in employment in the months ahead and reflects the low growth environment prevalent in Austria’s industrial sector, which is the main employer of leased staff.

### 5 Economic indicators have stabilized at low levels

Following record highs in early 2018, sentiment indicators and economic indicators for Austria have declined perceptibly. After reaching a trough in May and June 2019, several indicators have since recovered somewhat. The Economic Sentiment Indicator (ESI) rose from 102.3 points in June 2019 to 103.2 points in August 2019, which left it just above its long-term average of 100 points. Furthermore, the Purchasing Managers’ Index compiled by Bank Austria saw an increase of 0.7 points in August 2019. At 47.9 points, however, the index remains below the expansion threshold of 50 points, signaling a contraction of industrial production. Nevertheless, the downward trend of these confidence indicators seems to have come to an end and given way to stabilization, albeit at rather low levels. The same holds true for most of the indicators’ subcomponents, and also estimates for new (export) orders – which are crucial for further cyclical developments – have recovered somewhat. However, it remains to be seen over the coming months whether recent improvements will indeed lead to a real turnaround.

Chart 7

#### Growth composition of Austrian goods exports and imports by region



Source: Eurostat.

Note: Fluctuation interval in bars: 67%.

A breakdown of sentiment indicators by economic sectors presents a heterogeneous picture. In construction, optimism has remained buoyant, with confidence close to its historical highs. As indicated by the business cycle clock, which is based on both the assessment of the current situation and expectations for the months ahead, Austria's construction industry is clearly experiencing a boom phase. Similarly, consumer sentiment has remained at an above-average level. Their expectations regarding the near future, however, have dropped to their average, which leaves current consumer confidence on the brink of a slowdown in the business cycle clock. As regards the industrial and services sectors as well as retail trade, confidence indicators posted below-average levels. In line with numerous other indicators, the business cycle clock indicates that Austria's industrial sector is in the midst of a recession. Challenging external conditions have been weighing on the country's export-oriented industry for a few months, and the August survey figures signal that the domestic economy, after a long period of resilience, shows first signs of contagion. According to the business cycle clock, the services sector has not yet entered the quadrant indicating a recession, whereas the retail sector has already slid into that territory. Given weak export and industrial activity, risks of spillover effects on the domestic economy have thus been rising.

## 6 Results of the OeNB's Economic Indicator of August 2019: Modest economic downturn on the back of a slowing global economy

External conditions are set to remain challenging for Austria's economy in the second half of 2019. Export growth is expected to be modest, given the subdued outlook for global trade, a possible recession in Germany and the economic slowdown in the CESEE countries. As outlined above, Austria's export-oriented industry will also suffer from these developments.

By contrast, the results for the construction sector, which is largely decoupled from global developments, continue to point to a very favorable outlook. As in the past two years, investment in residential construction is forecast to continue its

Chart 8

### Outlook for Austrian real GDP<sup>1</sup> for the third and fourth quarters of 2019



Source: OeNB-Konjunkturindikator (the OeNB's short-term economic indicator), August 2019; WIFO.

<sup>1</sup> Seasonally and working-day adjusted trend-cycle component.

<sup>2</sup> Forecast.

robust expansion for the remainder of 2019, driven by benign financing conditions, rising real estate prices and buoyant demand. A slowdown in investment activity, as indicated by the trend in building permits, is not expected to materialize before 2020.

Private consumption is projected to remain the major pillar of growth. Recently, households have been spending much more confidently, while still being able to step up their savings. In the first quarter of 2019, the saving ratio rose to 7.9%, up 0.7 percentage points year on year, which leaves scope for additional private consumption in the future. In fact, households are expected to increase their spending further in the second half of the year thanks to strong real wage increases, robust – albeit moderating – employment growth and lagged effects resulting from the introduction of higher tax reliefs for families with children. However, the contribution of private consumption to growth is forecast to be somewhat weaker, as fewer new jobs will be created and unemployment rates will stop falling amid the slowing of economic activity.

Owing to relatively stable domestic demand, the OeNB expects the Austrian economy to continue to grow in the second half of 2019 despite adverse international conditions, and to do so at an only moderately slower pace than that observed in the first half of 2019. For the third quarter, real GDP is projected to grow by 0.2% quarter on quarter, which suggests that the Austrian economy is about to bottom out. The downward trend in leading indicators has let up recently, with key indicators even recording slight improvements, albeit largely at below-average levels. For the fourth quarter, real GDP growth is therefore anticipated to accelerate marginally to 0.3%. Compared with the figures of the OeNB's Economic Indicator of May 2019, growth expectations were revised downward by 0.2 percentage points for the third quarter of 2019. For the full year of 2019, however, real GDP growth is still forecast to reach 1.5%, as historical growth rates for both the fourth quarter of 2018 and the first quarter of 2019 have been revised slightly upward.

The risks to this forecast clearly point to the downside. Over the short term, external factors in particular (such as a hard Brexit, the further escalation of trade conflicts, the government crisis in Italy and the recession in Germany) may result in a stronger economic slowdown in Austria. Over the medium term, there is a risk that weak exports and industrial production will feed through more strongly to the domestic economy in general and the services sector in particular.

Table 2

### Outlook for Austrian real GDP<sup>1</sup> for the third and fourth Quarters of 2019

Q1 17	Q2 17	Q3 17	Q4 17	Q1 18	Q2 18	Q3 18	Q4 18	Q1 19	Q2 19	Q3 19	Q4 19
Quarterly change in %											
+0.7	+0.7	+0.7	+0.8	+0.8	+0.6	+0.4	+0.5	+0.4	+0.3	+0.2 <sup>2</sup>	+0.3 <sup>2</sup>
Year-on-year change in %											
+2.5	+2.7	+2.9	+2.9	+3.0	+3.0	+2.6	+2.3	+1.9	+1.6	+1.4 <sup>1</sup>	+1.3 <sup>2</sup>
2017				2018				2019			
Annual change in %											
+2.7				+2.7				+1.5			

Source: OeNB-Konjunkturindikator (the OeNB's short-term economic indicator), August 2019; WIFO.

<sup>1</sup> Seasonally and working day-adjusted trend-cycle component.

<sup>2</sup> Forecast.

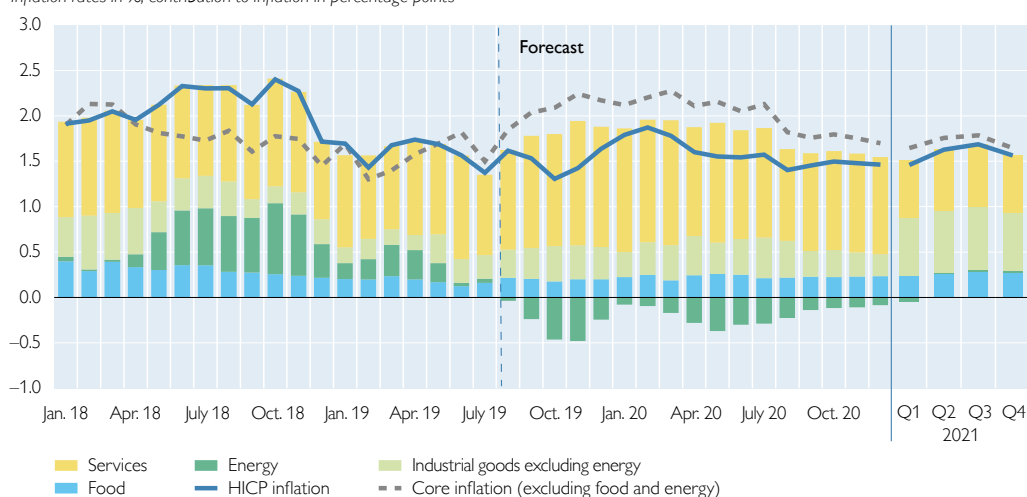
## 7 Inflation is set to remain constant until 2021

According to the OeNB's September 2019 inflation forecast, HICP inflation will come to 1.6% in 2019, and it will persist at this level in both 2020 and 2021. The year-on-year deceleration of HICP inflation vis-à-vis 2018 (2.1%) is mainly due to a decline in energy price inflation. By contrast, core inflation (excluding energy, food, alcohol and tobacco) is expected to increase from 1.8% in 2019 to 2.0% in 2020, before dropping to 1.7% in 2021 as a consequence of the slowdown in the Austrian economy. The pick-up in core inflation projected until early 2020 will be traceable to a comparatively sharp increase in unit labor costs. Additionally, robust

Chart 9

### Contribution of components to Austrian HICP and core inflation

Inflation rates in %; contribution to inflation in percentage points



Source: Statistics Austria, OeNB.

Table 3

### Assumptions of the OeNB inflation outlook of September 2019

	September 2019				Revisions since June 2019		
	2019	2020	2021	2019	2020	2021	
<b>Energy and exchange rates</b>							
<i>Change in %</i>							
Crude oil price (EUR/barrel Brent)	60.2	55.6	51.0	50.4	-8.2	-13.1	-10.0
USD/EUR exchange rate	1.2	1.1	1.1	1.1	-0.1	-0.3	-0.3
<b>Nonenergy commodity prices</b>							
<i>Index 2005=100</i>							
<i>Change in %</i>							
Total	133.7	129.4	133.8	138.7	0.2	-0.2	-0.4
of which: world market prices, food	140.5	136.1	142.5	149.8	-1.8	-4.9	-5.7
of which: world market prices, metallic raw materials	120.4	120.9	126.2	129.8	3.6	6.5	7.1
EU producer prices, food	107.0	108.9	107.3	107.5	-3.2	-6.6	-6.7
<b>Interest rates</b>							
<i>%</i>							
<i>Change in percentage points</i>							
Three-month interest rate	-0.3	-0.4	-0.6	-0.6	-0.1	-0.3	-0.4
Ten-year government bond yield	0.7	0.0	-0.2	-0.1	-0.3	-0.7	-0.7

Source: Eurosystem.

Table 4

**OeNB inflation outlook of September 2019**

	Forecast				Revisions since June 2019		
	2018	2019	2020	2021	2019	2020	2021
	Annual change in %				Change in percentage points		
HICP inflation	2.1	1.6	1.6	1.6	-0.1	-0.1	-0.1
Unprocessed food	0.3	0.3	1.3	x	-0.5	-0.4	x
Processed food	2.5	1.5	1.6	x	-0.1	-0.1	x
Nonenergy industrial goods	1.2	0.9	1.1	x	0.0	0.0	x
Energy	5.3	-0.2	-2.5	0.1		-2.0	0.3
Services	2.2	2.3	2.5	x	-0.1	0.1	x
HICP excluding energy	1.9	1.7	1.9	1.7	0.0	0.0	-0.2
HICP excluding food and energy	1.8	1.8	2.0	1.7	0.0	0.1	-0.2
<b>Public sector contribution to inflation</b>	Percentage points				Change in percentage points		
Total	0.3	0.3	0.4	0.3	-0.1	0.1	0.0
of which: indirect taxes	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
of which: administered prices	0.3	0.3	0.4	0.3	-0.1	0.1	0.0

Source: OeNB, Statistics Austria.

Note: The total contribution of the public sector to inflation was calculated based on rounded subcontributions.

domestic demand, particularly private consumption, will result in upward pressures on core inflation.

Compared with the OeNB's June 2019 inflation forecast, the projections for HICP inflation were revised downward by 0.1 percentage points for each of the years from 2019 to 2021. This string of downward revisions is attributable to the changed assumptions about global energy and food commodity prices. The assumptions about crude oil prices, which are informed by futures prices, in particular, but also those about food commodity prices were both revised downward from the June forecast (see table 3).

The OeNB expects the inflation rates of the services and nonenergy industrial goods components of core inflation to accelerate until 2020 (see table 4). This acceleration will be driven especially by benign labor market conditions and unit labor cost growth. In addition, consumption growth will remain at an above-average level. However, rising core inflation rates are projected to be balanced out by falling energy inflation rates, which means that, on the whole, HICP inflation will remain stable over the forecast horizon.

The recent decline in energy inflation is set to continue until November 2019, owing to expectations for plummeting oil prices and to an inflation-dampening base effect<sup>2</sup>. In 2020, energy inflation rates will remain negative, before stagnating in 2021. The assumption that crude oil prices will weaken further is expected to put downward pressures on fuel prices in particular, as fuels account for 49% of the HICP's energy component. Moreover, increases in electricity and gas prices that were implemented in the fall of 2018 and in recent months<sup>3</sup> are assumed to result in a base effect dampening inflation in the fall of 2019 and in 2020.

<sup>2</sup> In the second and third quarters of 2018, energy inflation accelerated notably.

<sup>3</sup> In October 2018, the common German-Austrian electricity market was split. Since then, there have been restrictions on electricity trading, which contributed to the pick-up in electricity and gas prices.

The inflation rate for nonenergy industrial goods is expected to come to 0.9% for the full year of 2019. In 2020, it is projected to climb to 1.1%, therefore remaining above the post-2013 average of 0.8%. Above-average levels of inflation will be supported by favorable cyclical developments coupled with relatively robust private consumption growth rates. In addition, the rise in nonenergy commodity prices will drive up the inflation rate for nonenergy industrial goods.

Starting in mid-2018, the growth rate of food prices (including alcohol and tobacco) has declined until recently, and is projected to pick up moderately over the forecast horizon. For 2019 as a whole, food price inflation is expected to come to 1.3%, and to increase thereafter to 1.5% in 2020 and to 1.7% in 2021. This rise is mainly due to tobacco tax hikes announced for 2020 and 2021, which will cause food price inflation to edge up by 0.1 percentage points in 2020 and by 0.16 percentage points in 2021.<sup>4</sup> Conversely, EU producer prices for food items are forecast to remain broadly unchanged (see table 3).

According to its current inflation forecast, the OeNB expects services inflation to rise from 2.3% in 2019 to 2.5% in 2020 due to the acceleration in unit labor costs, which will drive up inflation in market services<sup>5</sup> in particular. After having fallen sharply in recent times, prices of airline tickets and package holidays are projected to normalize.

The public sector's contribution to inflation (as measured by developments in administered prices and indirect taxes)<sup>6</sup> is assumed to range between 0.3 and 0.4 percentage points from 2019 to 2021. The OeNB's inflation forecast reflects all measures envisaged for the 2019 tax reform package for which legislative proposals have already been drafted (e.g. tobacco tax increases and VAT reductions on electronic media). However, these measures will only have a marginal impact on HICP inflation.

<sup>4</sup> The legislative proposal put forward in May 2019 envisages increases in tobacco taxes in both 2020 and 2021.

<sup>5</sup> According to the statistical classification of economic activities in the European Community (NACE), market services include NACE sections G to N. The sections most relevant to the HICP comprise accommodation and food service activities, information and communication, financial and insurance activities as well as professional, scientific and technical activities.

<sup>6</sup> Administered prices are fully or mainly set by the government or national regulators. In Austria, the share of administered prices in the HICP basket is around 10%, with services prices accounting for the lion's share of administered prices. Moreover, inflation developments are influenced by the public sector through changes in indirect taxes such as VAT, mineral oil and tobacco taxes.



# Equity ratios of Austrian nonfinancial corporations – evidence from balance sheet data

Christian Beer, Walter Waschiczek<sup>1</sup>

Refereed by: Michael Heiling, Austrian Chamber of Labor

*This article analyzes the equity ratios of Austrian nonfinancial corporations using balance sheet data. According to our data, the median equity ratio is about 34%, subject to strong heterogeneity across industries. While companies with a high share of tangible assets tend to have a low equity ratio, we find hardly any link between the share of intangible assets and the equity ratio. Our results suggest that low-tech companies have a lower equity ratio than companies with a higher level of technology intensity. However, high-tech companies do not generally exhibit a higher equity ratio than medium-tech companies. The median equity ratio of start-ups is higher than the overall median equity ratio but lower than the median equity ratio of all high-tech companies. Furthermore, our data suggest that the relationship between firm size and equity ratio is not linear – up to a certain size, the equity ratio decreases with firm size. At least in part, this might be due to the public information available about firms as we find a strong relationship between opaqueness and firm size. Firm age affects the equity ratio only for the first ten years of company life.*

JEL classification: E61, G1, G2, G32

Keywords: corporate finance, capital structure, equity ratio

Within the financing mix of a company, equity fulfills very specific tasks: It is available to companies permanently or at least on a long-term basis, it does not have to pay regular interest, and is a liquidity cushion in times of economic downturns. Moreover, equity holders are residual claimants if a company is liquidated, i.e. they will only be reimbursed after all other claims have been satisfied. Due to its long-term nature and risk-bearing capacity, equity is particularly important for financing long-term and risky investment projects. As a result, equity is of particular importance in areas such as financing start-ups or investments and innovations.

An adequate endowment of companies with equity fosters both macroeconomic and financial stability. From a financial stability perspective, one aspect to consider is the relation between capital structure and the probability of default. With rising indebtedness, borrowers' ability to repay becomes progressively more sensitive to drops in revenue and sales as well as increases in interest rates (Cecchetti et al., 2011).<sup>2</sup> From a cyclical point of view, in an economic downturn, the pressure of debt service causes highly leveraged firms to cut back investment (and, possibly, production and employment) more severely than low-leverage firms. Thus, high leverage may make the economy less stable (Bernanke and Campbell, 1988). Moreover, an insufficient equity base might lead to a debt overhang (Myers, 1977). Overindebted firms might find themselves in a situation where they cannot

<sup>1</sup> Oesterreichische Nationalbank, Economic Analysis Division, christian.beer@oenb.at, walter.waschiczek@oenb.at. Opinions expressed by the authors of studies do not necessarily reflect the official viewpoint of the OeNB or the Eurosystem. The authors would like to thank Walpurga Köhler-Töglhofer and Stefan Wiesinger (OeNB) as well as the referee for helpful comments and valuable suggestions.

<sup>2</sup> Moreover, Adalet McGowan et al. (2017) show that the increasing survival of old firms that have persistent problems meeting their interest payments ("zombie firms") hinder productivity growth in OECD countries.

take on additional debt to finance future projects, even if these projects could generate a positive net present value, because the prospective profit would be used to service existing liabilities. For the economy as a whole, the ensuing investment cuts might lead to a dampening of economic growth.

The finance literature offers two competing but not mutually exclusive models of firms' financing decisions. The trade-off theory (Kraus and Litzenberger, 1973) stresses that companies set a target leverage at which the benefits of debt financing (e.g., tax advantages or the mitigation of agency conflicts between managers and shareholders) just offset the direct and indirect costs arising from potential financial distress. The pecking order theory (Myers and Majluf, 1984; Myers, 1984) highlights the influence of asymmetrical information between outside investors or lenders and company management on the capital structure. In general, companies prefer internal over external financing because asymmetrical information increases financing costs; but if external funds are necessary, companies prefer debt to equity because debt financing entails lower costs and no outside shareholders.

Based on these theoretical considerations, the economic literature in recent decades has identified a large number of aspects that could affect the concrete capital structure of firms, which either refer to the legal and institutional framework of an economy or company-specific factors. While legal and institutional factors help explain the level of equity in an economy, they can only be employed in cross-country comparisons because within a country these factors are the same for all companies.

This article focuses on company-specific factors and provides a cross-sectional analysis of the equity ratio of Austrian companies for 2016, based on a comprehensive set of balance sheet data. In doing so, this paper adds to the economic policy debate on corporate finance in Austria by relating a number of different firm characteristics to the equity ratio. On the one hand, we address the equity situation of technology-intensive firms in general and of start-ups, in the sense of young technology-intensive firms, in particular. On the other hand, we look into the well-established feature that the difference in the equity ratio between smaller and larger companies is particularly strong in Austria.

The rest of the paper is structured as follows: Section 1 discusses the equity ratio indicator employed in this paper. In section 2, we present the data, and in section 3, we provide an overview of the characteristics of Austrian companies according to the determinants of the equity ratio suggested by theory. In section 4, we discuss the relationship between these determinants and the equity ratio of Austrian nonfinancial corporations. Section 5 concludes.

## 1 The equity ratio – calculation, meaning and limitations

As our analysis is based on financial statements, our definition of equity follows that of the Austrian Corporate Code, which defines equity as consisting of subscribed capital, capital reserves, convertible bonds and preference shares, retained earnings and the net profit or loss for the year (section 229). That is, equity comprises both externally raised equity and internally generated equity. As we use balance sheet data, our measure of the equity ratio is based on book values.

We calculate the equity ratio by dividing total equity by total assets. In other words, the equity ratio reflects the amount of equity a firm uses to finance its assets or, put differently, the amount of leverage it employs to finance its business.

This ratio is commonly used in continental Europe to analyze corporate capital structures, while in the U.S. the debt-to-equity ratio is more widespread.

There are a number of caveats in interpreting the equity ratio. For one, the balance sheet total and thus the equity ratio are affected by the type of financing a firm employs. For example, the use of operational leasing and factoring shortens the balance sheet, thus affecting the equity ratio irrespective of an underlying change in the economic situation. The equity ratio is also influenced by valuation of assets. This refers in particular to hidden reserves that arise when an asset is written off faster than it has actually lost value (e.g. through special depreciation), or when its value has increased over time (e.g. in the case of a property). This increase in value may not be disclosed openly in the balance sheet. Therefore, not all assets of a firm are necessarily recorded in the balance sheet. Thus, even if a company has negative equity, it is not necessarily overindebted. While in many cases, negative equity comes from accounting for accumulated losses from previous years, it can also mean that the firm is in a ramp-up stage, and has used a large amount of funds to create products and infrastructure that will later yield profits. As long as the company's cash flow is adequate to meet its bills, it can continue operating. Moreover, due to the capital links subsidiaries of a group may also have negative equity ratios.

Another point to consider is the lack of personal and business asset separation in limited partnerships (Kommanditgesellschaft, KG) where at least the general partner is personally liable for any debt of the partnership. In many cases, limited partnerships are able to obtain bank loans only by pledging personal assets as collateral. This is also often the case for limited liability companies, when banks ask owners and managing directors to provide personal guarantees to extend the limitation of liability before granting a loan.

## 2 The data

We use a database compiled by the OeNB's Statistics Department that combines annual financial statements from the company register (Firmenbuch) taken from the SABINA database and master data from the OeNB. The latter include items such as the industry standard classification system of economic activities used in the European Union, commonly referred to as NACE code, the legal form and the date of incorporation.

Corporations whose liability is limited are obliged to disclose their annual financial statements to ensure adequate protection of enterprises or persons doing business with them. In Austria, these include stock corporations (AG) and limited liability companies (GmbH) as well as limited partnerships that are part of a mixed form without a personally liable partner (such as GmbH & Co KG), and cooperatives. The scope of the disclosure requirements depends on company size.<sup>3</sup> Small firms are not required to report their assets and liabilities in full detail. Consequently, despite the comprehensive coverage of the database, only a few variables are available for all firms. For the large majority of firms in our sample the dataset contains only data for the main balance sheet items. The subitems as well as information from the profit and loss account (e.g. sales and revenues, costs and expenses) are available only for a comparatively small subset of several thousand companies.

<sup>3</sup> Section 221 of the Austrian Corporate Code classifies corporations as micro, small, medium-sized and large on the basis of different thresholds for total assets, annual turnover and number of employees.

This paper focuses on those balance sheet positions that are available for the wide sample. This has the advantage that we can use a sample that has a very high representativeness, but at the same time means that only a few positions can be included in the analysis. In particular, the analysis is limited to the main balance sheet items and does not include any items from the profit and loss account. Likewise, we cannot distinguish internally generated from externally raised equity, which also means that we cannot test the validity of the pecking order theory. Another drawback is that we do not have information on the ownership of the company. Consequently, we are not in a position to account for cross-ownership across companies, and we cannot separate firms within a group (e.g. subsidiaries) from stand-alone firms. Furthermore, we cannot analyze whether publicly owned companies behave differently than privately owned companies.

Overall, the database includes information on more than 143,000 companies. For our analysis, we take into account corporations and quasi-corporations (specifically stock corporations, limited liability companies, limited partnerships) from the nonfinancial sector. Hence, we exclude 7,805 companies that belong to a different sector or have a different legal form or for which information on the sector or the legal form is missing. Furthermore, 1,037 companies perform financial and insurance activities (NACE K) or are classified as public administration and defense or compulsory social security (NACE O) or their NACE classification is missing. For 801 companies we cannot calculate the equity ratio because the balance sheet total is zero or negative, or because information on equity is missing. Additionally, we exclude 2,568 very small companies from the analysis with assets of less than EUR 5,000, which is the legal minimum share capital.<sup>4</sup> Moreover, two-thirds of these companies have negative equity. Hence, it is questionable whether these very small firms are really engaged in some meaningful business activity. This leaves us with 130,967 companies for our analysis.

About 6% of all companies in our sample have an equity ratio of less than –100% and about 0.1% an equity ratio of above +100%. We cannot determine whether the extreme values reflect reporting errors or whether they are based on valid observations. While there is no generally agreed method for handling such observations, excluding them would affect the reported equity ratio in this paper.<sup>5</sup> Moreover, given the size of our dataset, outliers are less worrisome than they would be in a smaller dataset. For these reasons, we decided not to discard any observations on the basis of their equity ratio but to focus on the median as a more robust measure of central tendency and the distribution of the equity ratio according to its potential determinants.

### 3 Potential determinants of the equity ratio

The available data allow us to analyze the relevance of the following potential determinants of the equity ratio.

<sup>4</sup> The minimum share capital of a limited liability company is EUR 35,000. It is possible to start with a share capital of only EUR 10,000 (“Gründungsprivilegierung”), of which one half has to be paid immediately, subject to the obligation to raise the share capital to the amount of EUR 35,000 within 10 years after establishment. For a stock corporation, the minimum share capital is EUR 70,000. For a limited partnership, there are no minimum capital requirements.

<sup>5</sup> In the literature, different methods are used to handle these extreme values, e.g. trimming the dataset or winsorizing the top and bottom percentiles of the distribution.

*Industry:* We group the firms in our sample according to the first hierarchical NACE level. This first level includes 21 sections identified by alphabetical letters from A to U. Our database includes neither households as employers (T) nor extraterritorial organizations (U). As pointed out above, we have excluded firms that perform financial and insurance activities (K) or are assigned to public administration (O). Given the distinct scope of their activity, we treat the activities of head offices (NACE group 70.1) – which are classified under professional activities (M) in NACE – as a separate entity.<sup>6</sup> This division includes the overseeing and managing of other units of the same enterprise (or group). Additionally, we have merged education (P) and human health and social work activities (Q) as well as arts, entertainment and recreation (R) and other service activities (S), as the companies in these industries perform similar activities and the number of enterprises in these industries is comparatively low.<sup>7</sup> The largest number of firms can be found in trade (21% of all companies), real estate (14%) and professional activities (13%). Grouping the industries into the three classical economic sectors, about half a percent of companies in our database belong to the primary sector (agriculture), about 21% to the secondary sector (production of goods) and about 79% to the tertiary sector (supplying of services).<sup>8</sup>

*Level of technology:* As pointed out above, equity is of particular relevance for financing research and development (R&D) activities. As our data do not allow measuring R&D activities of firms directly, we employ the sectoral approach used in Eurostat's Statistics on high-tech industries and knowledge-intensive services (Eurostat, 2018). Therefore, the technology variable is based on NACE classification, albeit on a more granular division than the industry variable (3-digit code for manufacturing, 2-digit code for services). However, technology is only defined for manufacturing and services and thus neither for the primary sector nor for energy, utilities and construction. Following the Eurostat classification, the manufacturing (sub)industries are mapped to the following technology levels: high-technology (pharmaceutical products, computer, electronic and optical products, air and spacecraft and related machinery), medium high-technology (e.g. chemicals and chemical products, weapons and ammunition), medium-low technology (e.g. reproduction of recorded media, coke and refined petroleum products), low technology (e.g. food products, beverages). Services are broken down into high-tech knowledge-intensive services, (e.g. information service activities, scientific research and development), knowledge-intensive services (e.g. advertising and market research), and less knowledge-intensive services (e.g. wholesale and retail trade, real estate activities). Additionally, we merge the high-technology manufacturers and high-tech-knowledge-intensive services into the category high-tech.

Only 6.5% of all companies in our sample are high-tech companies (4.5% of all manufacturers, 6.8% of all services). At the same time, about 38% of all manufacturers are categorized as low technology and about 61% of all services as less knowledge-intensive services. The high proportion of less knowledge-intensive services follows from the high proportion of trade and real estate activities in the

<sup>6</sup> Additionally, entities classified by Statistics Austria as belonging to both NACE K.64.2 (Activities of holding companies) and the institutional sector S 11 are grouped under this section by the OeNB's statistics department.

<sup>7</sup> For the terminology employed here and the NACE code, see Table A1.

<sup>8</sup> For information on the number of companies see, Table A2.

service sector. With a median age of eight years high-tech companies are somewhat younger than non-high-techs (10 years). The median balance sheet total of high-techs (EUR 200,000) are less than half of the median balance sheet total of non-high-techs (EUR 500,000).

Amongst high-tech firms, start-ups have recently received particular attention in the economic policy debate.<sup>9</sup> There is no standard definition of a start-up, but most definitions comprise some similar features. There is general agreement that start-ups are companies in the first phase of their life cycle. We set the limit at four years. Furthermore, we only consider SMEs as potential high-tech firms as it is often done in public sector funding guidelines. However, not every young company is a start-up. Most of the definitions also refer to the business purpose and business model of the company, which should be innovative and growth-oriented. Again, this is difficult to operationalize. We approximate innovative by high-tech companies as defined above. According to this definition, about 2% of all Austrian companies and 34% of all high-tech companies are start-ups.

*Asset structure:* The Austrian Corporate Code breaks down fixed assets into three components: intangible assets, tangible assets and financial assets. However, information on these assets is missing for a relatively large number of companies. Specifically, tangible assets as a share of total assets are available for 80% of all companies in our sample, intangible assets as a share of total assets for 42% and the financial assets ratio for 40%. For intangible assets and financial assets as a share of total assets, the share of missing observations depends strongly on firm size. The financial assets and intangible assets ratios are only available for 32% and 38% of all micro firms, respectively, but for 85% and 58% of all large companies. For those companies for which the tangible assets ratio is available the median ratio is 17%. If the intangible assets ratio is available, it is generally very small (median 0.29%) and about a third of all companies that report an intangible assets ratio specify a value of zero.

*Firm size:* For classification by size, we refer to European Commission (2003) where companies are grouped primarily according to staff headcount and additionally according to turnover or total assets. However, as staff headcount is available only for less than half and turnover for less than 20% of all firms in our sample, we classify companies solely according to their total assets. Accordingly, micro enterprises are companies with total assets of up to EUR 2 million, small companies have total assets of between EUR 2 million and EUR 10 million, and medium-sized companies of between EUR 10 million and EUR 43 million. Companies with total assets of more than EUR 43 million are classified as large companies. Together, micro enterprises, small enterprises and medium-sized enterprises form the category small and medium-sized enterprises (SME), which is often referred to in economic policy discussions. As pointed out above, we cannot account for whether the companies are autonomous or are linked to other enterprises. About 98% of the firms in the sample are SME, of which more than three-quarters are micro firms.

*Age:* We calculate age using the date of the first entry in the commercial register<sup>10</sup> and group companies into five age classes: 1 to 4 years (29% of the firms in the

<sup>9</sup> For the role of finance for start-ups in general, see Gassler et al. (2018).

<sup>10</sup> We do not use the founding year because a company constitutes an economic entity only once it has been entered in the commercial register (Wiesinger, 2015).

sample), 5 to 9 years (21%), 10 to 19 years (26%), 20 to 29 years (15%), and 30 years and older (10%). The notion that younger firms are usually smaller as firms tend to grow with time is also reflected in our data. About 86% of all enterprises that are up to 4 years old are micro enterprises and only 0.8% are large enterprises. In contrast, only 64% of the firms that are at least 30 years old are micro enterprises and 5% are large enterprises.

*Opaqueness:* Public availability of information about a firm (or the lack of it) is often seen as a major determinant for its access to outside finance. As discussed above, companies are only required to make a limited amount of information about themselves public, and the legal disclosure requirements depend on company size. Companies might however opt to make more information public than they are required to do. It is possible that a firm chooses the degree of opaqueness and the type of financing simultaneously. That is to say, as firms tend to consider sharing information with outsiders as disadvantageous (or not as advantageous at any rate), they tend to provide information only when there is an economic incentive to do so. A case in point would be that companies within a group (which we cannot single out with our data) have no reason to provide information to the public for getting finance.

To operationalize the opaqueness of a company we calculate the share of variables with missing values in SABINA for each company in our dataset.<sup>11</sup> As SABINA is compiled based on information from the company register, this measure can serve as an indication of the amount of publicly available information about a company. We normalize these shares so that the variable takes the value 1 for the most opaque company and 0 for the least opaque one.

As predicted by standard financial theory, our data suggest that larger firms are less opaque than smaller ones. Although for the bigger part of the size distribution, the decline is only gradual and only the largest 10% of companies exhibit on average a significantly lower opaqueness than smaller firms. Moreover, opaqueness is inversely correlated with age. In general, younger firms are more opaque than more mature ones. 32% of firms up to 4 years of age fall into the quartile with the highest opaqueness, and only 12% into the lowest opaqueness group. Conversely, only 16% of the firms that are 30 years or older belong to the highest opaqueness group, while 42% are part of the least opaque companies. Very opaque companies have a tangible assets ratio that is significantly above average; the median tangible assets ratio for the highest opaqueness quartile amounts to 60%.

*Legal form:* The vast majority of companies analyzed are limited liability companies (93%). Limited partnerships account for 6.4% of the firms in the sample, mostly formed with the sole general partner being a limited liability company (GmbH & Co KG). Only 0.5% of the firms are stock corporations.

#### 4 How are these determinants related to the equity ratio?

Overall, the median value of the equity ratio of all firms in our sample is 34.1%, which masks a very high degree of heterogeneity, however. As much as 20% of the enterprises have a negative equity ratio, whereas 0.1% have an equity ratio of more than 100% (implying negative debt).

<sup>11</sup> Disregarding variables from the master data provided by the Statistics Department of the OeNB and variables that are derived from other variables, e.g. the equity ratio.

Table 1.1

Total		Size					Legal form			Age (years)					Opacity (quartiles)				Tangible assets ratio (quartiles)				
		Me- dian	Inter- quartile range	micro	small	me- dium	SME	large	AG	KG	up to 4	5–9	10–19	20–29	30+	1	2	3	4	1	2	3	4
<i>Median values (%), 2016</i>																							
<b>Industry</b>																							
Manufacturing	36.4	53.6	35.7	34.8	37.9	35.8	42.9	38.1	41.9	20.8	25.0	32.6	38.7	40.7	41.2	36.2	29.1	27.1	77.3	34.1	38.1	35.5	22.0
Energy	14.3	50.1	18.1	6.7	16.6	13.3	32.7	14.2	41.4	10.8	6.8	8.7	21.0	34.6	51.8	16.7	8.5	10.5	40.0	29.8	40.2	32.7	7.0
Utilities	36.6	55.6	40.1	33.1	40.6	37.1	27.4	39.4	35.5	21.9	26.7	34.5	39.0	45.5	43.6	39.6	28.7	34.0	67.9	34.1	38.6	38.3	26.0
Construction	30.2	54.9	32.7	23.2	25.4	30.3	24.2	31.6	35.3	14.2	19.4	31.7	35.1	37.8	35.8	34.0	30.2	23.8	22.9	25.2	34.5	34.6	14.4
Trade	32.1	59.7	30.9	34.9	35.6	32.1	36.1	33.3	41.8	15.4	17.6	29.4	37.2	40.5	41.6	34.6	29.4	22.8	49.2	30.7	33.3	29.6	16.7
Transportation	30.7	54.8	31.1	28.8	29.7	30.5	35.2	31.8	40.9	14.8	22.6	28.8	32.9	33.4	37.8	29.7	26.1	27.1	61.3	25.6	32.6	31.3	18.6
Accommodation	14.0	74.0	12.5	15.2	25.1	13.9	27.5	15.1	24.3	5.9	5.1	13.9	22.6	20.7	16.5	17.5	9.0	1.4	58.9	22.1	22.5	11.9	5.9
Information	43.3	64.3	44.1	39.3	38.1	43.4	39.1	43.9	36.5	31.3	38.9	43.4	45.7	44.3	48.1	38.5	43.0	46.2	51.5	43.8	42.8	41.8	26.3
Real estate	19.8	67.0	22.8	12.7	22.3	19.3	34.0	21.3	49.1	9.6	6.1	17.5	26.6	44.2	54.6	35.8	31.2	19.1	7.4	35.7	44.6	39.3	10.9
Professional activities	49.7	59.9	50.7	38.2	43.5	49.7	38.0	50.0	45.7	33.9	46.7	52.0	51.4	47.5	47.0	41.1	48.5	52.8	59.9	50.0	48.9	47.3	22.7
Head offices	70.7	76.8	65.0	71.6	80.8	69.5	83.3	71.2	67.1	39.3	64.5	67.1	74.4	77.2	77.0	67.1	65.0	72.6	73.4	61.4	67.0	64.8	31.1
Administration	30.8	56.7	30.9	32.1	29.5	30.9	12.2	32.1	25.9	12.1	24.0	33.2	31.8	35.3	38.1	31.1	30.7	27.1	38.3	28.8	33.3	33.8	16.4
Social activities	33.8	63.2	37.3	21.3	24.3	33.8	18.4	34.9	17.8	17.2	23.6	30.1	38.7	46.9	40.4	24.8	36.4	37.5	50.9	43.9	37.5	28.3	10.3
Arts and Entertainment	25.1	79.0	25.1	24.3	27.1	25.1	38.3	26.3	50.9	6.9	12.5	28.9	32.5	33.6	32.6	24.1	22.7	21.4	50.0	29.8	39.4	26.6	7.0
Mining	40.8	62.8	40.2	36.9	49.2	40.5	64.3	44.9	52.1	19.2	17.3	49.8	40.1	46.4	42.8	40.0	29.9	40.1	82.6	28.2	20.1	33.3	40.6
Agriculture	22.4	56.7	18.1	43.9	50.2	21.9	72.4	21.9	73.8	27.3	14.5	28.3	38.8	26.0	35.7	32.6	17.5	19.1	16.6	18.8	24.9	31.4	14.1
<b>Total</b>	34.1	65.3	34.9	29.1	36.1	33.8	46.4	35.6	49.5	14.6	21.9	33.2	39.2	41.3	42.3	34.2	32.9	32.2	41.3	36.6	38.5	33.7	12.8
<b>Sector</b>																							
Primary	22.4	56.7	18.1	43.9	50.2	21.9	72.4	21.9	73.8	27.3	14.5	28.3	38.8	26.0	35.7	32.6	17.5	19.1	16.6	18.8	24.9	31.4	14.1
Secondary	32.5	55.2	33.3	27.7	34.6	21.9	38.8	33.8	40.9	17.4	20.0	29.9	36.0	39.7	39.2	34.8	29.0	23.7	44.6	27.8	35.8	35.2	15.6
Tertiary	34.9	67.9	35.7	29.6	37.1	21.9	52.2	36.4	52.8	13.5	22.5	34.1	40.2	42.2	44.1	33.9	34.3	33.8	40.7	38.6	39.7	33.1	12.2

Source: SABINA, OeNB, own calculations.

Note: Definitions are given in the text. For NACE classifications see Table A1 in the annex.



#### 4.1 The role of technology

There is a strong heterogeneity in the equity ratio across industries. The median equity ratio is only 14% for accommodation but 50% for professional activities and even 71% in the case of head offices (see table 1). The economic literature has identified a number of possible explanations for this heterogeneity. For example, financing decisions may be affected by industry structure, such as the number of firms that are active in an industry as well as the level and forms of competition in an industry (Frank and Goyal, 2009; MacKay and Philips, 2005). As a crude measure to vindicate this proposition, we correlate equity ratios across industries and the Herfindahl-Hirschman index (HHI) of total assets as a proxy for the concentration within the individual industries. However, the correlation between the HHI and the equity ratio across industries is slightly negative ( $-0.06$ ).

Furthermore, the capital structure is affected by the type of production and the technologies employed. For example, according to Titman and Wessels (1988), firms that manufacture machines and equipment should be financed with relatively more equity. This assertion is corroborated by the fact that manufacturing exhibits an above-average equity ratio although tangible assets ratio is above the average, too.

Moreover, different technologies employed by different industries require different endowments with (different types of) fixed assets. In this respect, the amount of tangible assets employed impacts the financing decisions of firms in several ways. Tangible assets are easier to value and hence easier to pledge as collateral when raising secured debt (Frank and Goyal, 2009). Furthermore, agency costs between owners and creditors are smaller when firms offer tangible assets as collateral. Our data show that companies with a high tangible assets ratio tend to have a low equity ratio. Companies in the highest quartile of the tangible asset ratio have a median equity ratio of only 13% while companies in the lowest quartile have a median equity ratio of 37%. Differences are also apparent at the industry level. Accommodation, energy and real estate activities, the three industries with the lowest equity ratio, have high tangible assets ratios (median values of 56%, 83%, 82%, respectively) whereas industries with a low tangible assets ratio, such as information (5%) or professional activities (6%), have high equity ratios.

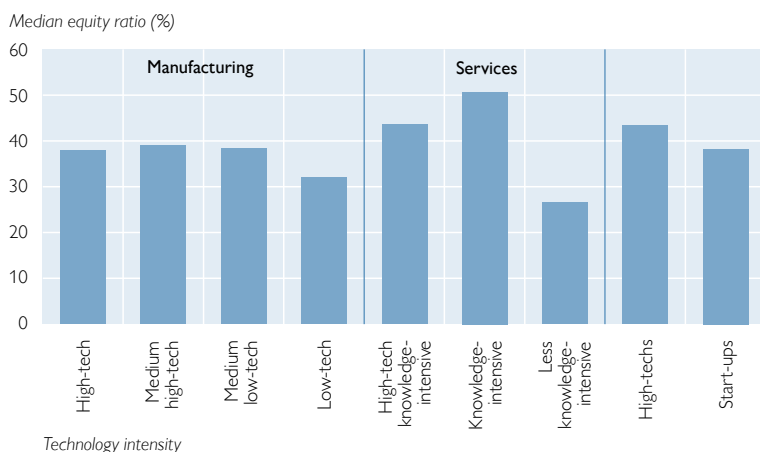
In contrast, we find hardly any link between the intangible assets ratio and the equity ratio.<sup>12</sup> The equity ratio generally increases with the financial assets ratio. In this respect, head office activities are noteworthy as they exhibit both a far above-average financial assets ratio and the highest equity ratio. The median financial assets ratio of head office activities amounts to 55% compared to 4.7% across all companies.

Furthermore, the literature posits a positive correlation of the equity ratio with R&D intensity. One reason is that there is usually no secondary market for R&D and that R&D is hard to collateralize (Titman and Wessels, 1988). Moreover, the long-term nature of R&D and the high risks in terms of the probability of success of R&D projects give rise to agency issues, especially during the initial stages (Berk et al., 2004). Our data suggest that low-technology manufacturers and less knowledge-intensive services have a significantly lower equity ratio than other manufacturers or services (chart 1). The low equity ratio of low-tech manufactures and less knowledge intensive services might be linked to their relatively high tangible assets

<sup>12</sup> However, this result as well as the results regarding the financial assets ratio might be biased because of a relatively high number of missing values.

Chart 1

### Equity ratio and technology



Source: SABINA, OeNB, own calculations.

ratio, which enables them to take on more debt. Furthermore, high-tech knowledge-intensive services and knowledge-intensive services have a higher equity ratio than high-tech manufactures. Within the manufacturing sector the median equity ratio of high-tech manufactures does not differ significantly from the median equity ratio of medium high-technology and medium low-technology enterprises. Consequently, for manufacturing our data do not support the conclusion that high-tech companies have a higher equity ratio in general than non-high-tech companies.

The median equity ratio of start-ups is 38%, which is about 4 percentage

points higher than the overall median equity ratio but about 5 percentage points lower than the median equity ratio of all high-tech companies.<sup>13</sup> However, the equity ratio is positively correlated with company age, at least up to a certain age (see below). Comparing start-ups with other young companies, which exhibit an equity ratio of 22%, the equity ratio of start-ups is 16 percentage points higher.

#### 4.2 The role of firm size

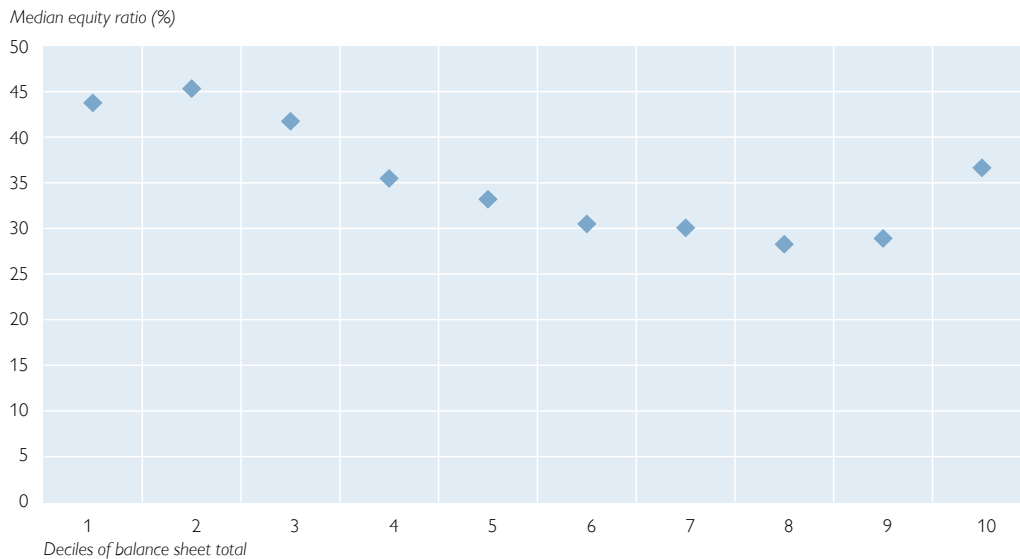
It has been a recurrent theme in Austrian economic policy that smaller firms have lower equity ratios than larger ones (OeNB, 2014; Dirschmid and Waschiczek, 2005). The trade-off theory posits a positive relationship between the size of the firm and the equity ratio. A number of authors have suggested that larger firms have a lower risk of financial distress because their investment projects and their revenues tend to be more diversified (Titman and Wessels, 1988; Rajan and Zingales, 1995). In this vein, prospective outside investors might consider firm size as an inverse proxy for the probability of default. In contrast, the pecking order theory stresses informational aspects. As there are economies of scale in producing information, there tends to be less public information available about smaller firms. For example, financial statements of smaller firms are often less comprehensive. A case in point is the fact that there are fewer corporate register reporting requirements for smaller firms. Thus, as they are more informationally opaque than larger firms, smaller companies tend to use less outside equity to finance their investment projects (Harris and Raviv, 1991). On the other hand, opaque companies might have to rely relatively more on internally generated equity. Hence, from the point of view of the pecking order theory, the impact of size on the overall equity ratio is *prima facie* ambiguous.

In general, firms in the highest opaqueness quartile (that is, the most opaque firms) have significantly higher equity ratios than less opaque companies, whereas

<sup>13</sup> This result is not influenced by setting the maximum age of a start-up at 4 years in our definition. When choosing other age brackets (such as 2–4, 2–6 or up to 6 years), the median equity ratio changes only marginally.

Chart 2

### Size and equity ratio



Source: SABINA, OeNB, own calculations.

in the first three quartiles, the differences are not very pronounced. As discussed above, firms might provide information to outsiders above the legal minimum requirements when they have economic incentives to do so. If that is the case, the capital structure is not a consequence of opaqueness; much rather the level of opaqueness is a deliberate decision in line with the financial needs of the firm. This view would correspond to Berger and Udell's (1998) idea of a financial growth cycle, in which financial needs and options change as the firm grows, gains further experience, and becomes less informationally opaque.

Turning to the correlation between the equity ratio and size, our data suggest the relationship between size and equity ratio is not linear (chart 2). Disregarding the smallest firms up to total assets of about EUR 40,000 the equity ratio declines with company size. Only for the 20% largest companies the equity ratio is increasing again. The median equity ratio for micro enterprises is 35% and thus higher than for small (29%) and only slightly lower than for medium-sized (36%) enterprises but smaller than for large firms (46%). This decrease with firm size cannot entirely be explained by the theories discussed above. One potential reason is that the tangible assets ratio is increasing in size up to about the 90th percentile of total assets. Hence, very small companies have on average a relatively low tangible assets ratio, making it more difficult to obtain outside funding. To some extent, legal minimum capital requirements contribute to the observed non-linear relationship between firm size and equity ratio. As it is possible to start a limited liability company with a share capital of only EUR 5,000, micro enterprises with a very low net worth but minimum paid-in capital have a higher equity ratio than companies with higher total assets with the same minimum capital. This is reflected by the fact that for micro firms, the median share of subscribed capital in total capital amounts to 21%, whereas it is 3% for other firms. Consequently, in the case of micro firms, subscribed capital contributes 14% to the balance sheet total, compared to 1.1% for others.

Age is a further variable for which theory predicts a positive impact on the equity ratio. One reason is that older firms usually have more internal funds from retained earnings as they had more time to build up reserves. Moreover, unprofitable firms usually do not get old. However, we find a positive correlation between age and equity ratio only for the first ten years of company life. Thereafter, the correlation vanishes. Here, other features that influence a firm's equity ratio and also change over the life cycle of a firm might be at play. For example, the tangible assets ratio that reaches a minimum for companies that are about ten years old is increasing for older companies, suggesting a larger role for debt financing. Furthermore, older firms are on average larger than younger ones. Hence, the relationship between size and equity ratio discussed above can also play a role in the life cycle effects on the equity ratio.

Finally, equity ratios differ substantially according to the legal form of the firm. The median equity ratio for stock corporations amounts to 50%, whereas it is 36% for limited liability companies and only 15% for limited partnerships. As the vast majority of the firms in our sample are limited liability companies, they strongly shape the overall median equity ratio. To some extent, the differences in the legal minimum capital requirements for different legal structures might affect the differences in the equity ratio, especially in the early years of a company. The low values for limited partnerships might be explained by the considerations about the nonseparation of personal and business assets discussed in section 1. The differences in the equity ratio across legal forms might also reflect the influence of size. With median total assets of EUR 30 million, stock corporations are much larger than limited liability companies (EUR 461,000) or limited partnerships (EUR 993,000). Furthermore, stock corporations are less informationally opaque than other companies as legislation pertaining to stock corporations is tailored to large public companies, subjecting stock corporations to substantially more requirements concerning public information compared with other legal forms. As a consequence, they have easier access to outside equity financing.

## 5 Summary and conclusions

This article provides an overview of the equity ratio of Austrian nonfinancial firms using an extensive database based on SABINA and OeNB data. While allowing for a broad coverage in terms of the number of firms, our approach entails a limited number of variables for which data are available for all companies. Nevertheless, it allows some conclusions that might be relevant for economic policy.

For one, we have addressed the relationship between technology intensity and the equity ratio. Low-tech companies have a lower equity ratio than companies with higher technology intensity. This pattern is more pronounced in the service sector than in manufacturing. However, the median equity ratio of high-tech manufactures does not differ significantly from the median equity ratio of medium-low-technology manufacturers. Start-ups exhibit a higher equity ratio than young companies outside the high-tech sector. At the same time, the technology employed, represented by the intensity of the use of tangible assets, affects the equity ratio. Specifically, industries with higher tangible assets ratio have a lower equity ratio.

The second finding of our paper is that the relationship between firm size (in terms of total assets) and equity ratio is not linear. Up to a certain size, the equity ratio decreases with firm size. At least in part, minimum capital requirements

might also contribute to the higher equity ratio of micro enterprises. We find a strong relationship between opaqueness and firm size, and the most opaque firms have significantly higher equity ratios. On the one hand, opaqueness might be a hindrance to raising outside equity. On the other hand, the degree of opaqueness might be a deliberate decision of firms, based on cost-benefit considerations weighing the additional cost of providing information to outsiders against the additional benefit of outside equity capital. In contrast, firm age – which is also related to firm size, as older firms are on average larger than younger ones – affects the equity ratio only in the first decade of company life. Here, the endowment with tangible assets might play a role as the tangible assets ratio reaches a minimum at about that age.

However, including nearly all companies in the analysis entails some limitations as the number of variables that is available for all companies is limited. Using a subsample of companies for which a larger number of variables is available, future research could for example analyze the relationship between the equity ratio and firm size in a multivariate framework. Furthermore, such a subsample may be used to address the relative importance of internally generated and externally raised equity. Another point meriting scrutiny is the interplay between opaqueness and the equity ratio or – in more general terms – the interplay between size, age, opaqueness and equity ratio. Finally, it might be worthwhile to look at those 20% of the Austrian companies that report a negative equity ratio.

In recent years, Austria has implemented a number of policy measures to foster equity financing, especially for young and innovative enterprises and regarding venture capital financing (see for example Gassler et al. 2018). These measures can be expected to enable firms to increase their equity ratio further, although it will take time until these initiatives show their full effect.

In this respect, it has to be taken into account that financial matters are now decided mostly on the European level, so that in general there is little scope for national policies. The proposal for an EU-wide Capital Markets Union is a prominent case in point. In this sense, supporting the various initiatives on the individual elements of the Capital Markets Union constitutes one of the key starting points for further expanding equity-based corporate financing.

There are other reasons why further policy measures targeted to increase the equity ratio are not necessarily required. In the current situation, the capital requirements of companies are covered primarily by internal financing and very low-interest debt. Generally, Austrian firms consider access to finance to be a relatively small problem, as, for example, the Survey on the Access to Finance of Enterprises (SAFE) shows (ECB, 2018). Especially younger firms require not only (equity) finance but also other forms of support. Thus, the role of venture capital goes beyond its financing function but consists also in monitoring and providing expertise and support for the management of the companies in which they invest. This supporting function, which is a key aspect of venture capital financing especially in the early stages of funding, e.g. in the start-up and expansion stage of companies, cannot be increased easily by policy measures.

## References

- Adalet McGowan, M., D. Andrews and V. Millot. 2017.** The Walking Dead? Zombie Firms and Productivity Performance in OECD Countries. OECD Economics Department Working Papers 1372. OECD Publishing, Paris.
- Bernanke, B. and J. Y. Campbell. 1988.** Is There a Corporate Debt Crisis? Brookings Papers on Economic Activity 1. 83–125.
- Berger, A. N. and G. F. Udell. 1998.** The Economics of Small Business Finance: The Roles of Private Equity and Debt Markets in the Financial Growth Cycle. In: *Journal of Banking and Finance* 22. 613–673.
- Berk, J. B., R. C. Green and V. Naik. 2004.** Valuation and Return Dynamics of New Ventures. In: *Review of Financial Studies* 17. 1–35.
- Cecchetti, S. G., M. S. Mohanty and F. Zampolli. 2011.** The real effects of debt. BIS Working Paper 352. September.
- Dirschmid, W. and W. Waschiczek. 2005.** Institutional determinants of equity financing in Austria. In: *OeNB Financial Stability Report* 9. 77–92.
- ECB. 2018.** Survey on the Access to Finance of Enterprises in the euro area. April to September 2018. November.
- European Commission. 2003.** Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises. C(2003) 1422.
- Eurostat. 2018.** Glossary: High-tech. *Statistics Explained*. July 4.
- Frank, M. and V. K. Goyal. 2009.** Capital Structure Decisions: Which Factors are Reliably Important? In: *Financial Management*. Spring. 1–37.
- Gassler, H., W. Pointner and D. Ritzberger-Grünwald. 2018.** Financing growth of small and medium sized enterprises and startups in Austria. In: *OeNB Financial Report* 36. December.
- Harris, M. and A. Raviv. 1991.** The theory of capital structure. In: *Journal of Finance* 46. 297–355.
- Kraus, A. and R. H. Litzenberger. 1973.** A State-Preference Model of Optimal Financial Leverage. In: *Journal of Finance* 28. 911–922.
- MacKay, P. and G. M. Phillips. 2005.** How Does Industry Affect Firm Financial Structure? In: *The Review of Financial Studies* 18(4). 1433–1466.
- Myers, S. C. 1977.** Determinants of Corporate Borrowing. In: *Journal of Financial Economics* 5. 147–175.
- Myers, S. C. 1984.** The capital structure puzzle. In: *Journal of Finance* 39. 575–592.
- Myers, S. C. and N. S. Majluf. 1984.** Corporate financing and investment decisions when firms have information that investors do not have. In: *Journal of Financial Economics* 13. 187–224.
- OeNB. 2014.** Austrian SMEs' Access to Finance – Evidence in BACH Data. Box 1. In *OeNB Financial Stability Report* 28. December. 26–27.
- Rajan R. and L. Zingales 1995.** What Do We Know about Capital Structure? Some Evidence from International Data. In: *Journal of Finance* 50. 1421–1460.
- Titman, S. and R. Wessels. 1988.** The determinants of capital structures choice. In: *Journal of Finance* 43. 1–19.
- Wiesinger, S. 2015.** Innersektorale Kredite und Handelskredite als Substitut klassischer Bankkredite? In: *OeNB Statistiken Q4/15*. 35–48.

## Annex

Table A1

**A1 NACE codes of industries and abbreviations**

Sector	Code	Description	Short form used in text
Primary	A	Agriculture, Forestry and Fishing	Agriculture
Secondary	B	Mining and Quarrying	Mining
	C	Manufacturing	Manufacturing
	D	Electricity, Gas, Steam and Air Conditioning Supply	Energy
	E	Water Supply; Sewerage, Waste Management and Remediation Activities	Utilities
	F	Construction	Construction
Tertiary	G	Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	Trade
	H	Transportation and Storage	Transportation
	I	Accommodation and Food Service Activities	Accommodation
	J	Information and Communication	Information
	L	Real Estate Activities	Real estate
	M	Professional, Scientific and Technical Activities	Professional activities
	M70.1	Activities of head offices	Head offices
	N	Administrative and Support Service Activities	Administration
	P; Q	Education; Human Health and Social Work Activities	Social activities
	R; S	Arts, Entertainment and Recreation; Other Service Activities	Arts and Entertainment

Source: Eurostat.

Table A2.1

## Number of Austrian nonfinancial corporations in the sample

Industry	Total				Legal form			Age (years)					Opacity (quartiles)				Tangible assets ratio (quartiles)					
	Size				large	GmbH	AG	KG	up to 4	5-9	10-19	20-29	30+	1	2	3	4	1	2	3	4	
	micro	small	me- dium	KMU																		
Manufacturing	10776	7155	2248	910	10.313	463	9738	80	958	1924	1724	3005	2192	1929	5470	2678	1412	1216	1328	2574	4005	1587
Energy	1491	897	381	128	1406	85	1265	31	195	414	406	490	102	79	582	298	331	280	85	51	217	933
Utilities	613	397	154	43	594	19	563	4	46	111	107	182	149	64	245	158	119	91	64	67	197	202
Construction	14188	11602	2140	377	14119	69	13305	15	868	4367	2709	3286	2213	1612	4344	4312	2887	2645	2696	4063	3522	1513
Trade	26851	21619	3949	952	26520	331	25352	65	1434	6730	5017	6749	4748	3605	8430	8073	5870	4478	7321	7032	5849	2226
Transportation	4572	3457	784	233	4474	98	4091	56	425	958	794	1175	849	795	1580	1183	988	821	673	739	1331	1174
Accommodation	8320	6602	1430	267	8299	21	7520	4	796	2487	1743	1963	1394	733	2666	2413	1815	1426	454	1037	2205	3539
Information	7192	6394	596	145	7135	57	6887	43	262	2393	1611	2129	723	336	1751	2062	2134	1245	2552	2034	1044	333
Real estate	18105	11363	4782	1527	17672	433	16051	70	1984	6378	3707	4098	2304	1618	1868	3178	6117	6942	1458	1206	2148	9676
Professional activities	17348	15665	1381	247	17293	55	16714	53	581	5091	4203	5460	1804	789	2964	5535	5434	3415	5595	4949	2619	1015
Head offices	10072	5748	2328	1124	9200	872	9610	273	189	3390	2442	2582	978	680	1207	1114	3291	4460	1329	490	747	902
Administration	5247	4341	644	185	5170	77	4969	12	266	1642	1143	1342	749	369	1206	1512	1486	1043	1388	1197	1005	771
Social activities	2118	1756	294	63	2113	5	2014	2	102	583	493	688	273	80	603	649	504	362	391	525	539	359
Arts and Entertainment	2917	2535	287	74	2896	21	2711	12	194	876	640	731	441	229	744	855	754	564	420	503	741	819
Mining	310	172	91	27	290	20	269	2	39	46	50	79	65	70	150	47	63	50	13	27	116	83
Agriculture	847	666	155	22	843	4	788	4	55	387	210	177	44	29	195	240	252	160	35	64	265	403
<b>Total</b>	<b>130967</b>	<b>100369</b>	<b>21644</b>	<b>6324</b>	<b>128337</b>	<b>2630</b>	<b>121847</b>	<b>726</b>	<b>8394</b>	<b>37777</b>	<b>26999</b>	<b>34136</b>	<b>19028</b>	<b>13017</b>	<b>34005</b>	<b>34307</b>	<b>33457</b>	<b>29198</b>	<b>25802</b>	<b>26558</b>	<b>26550</b>	<b>25535</b>
<b>Sector</b>																						
Primary	847	666	155	22	843	4	788	4	55	387	210	177	44	29	195	240	252	160	35	64	265	403
Secondary	27378	20223	5014	1485	26722	656	25140	132	2106	6862	4996	7042	4721	3754	10791	7493	4812	4282	4186	6782	8057	4318
Tertiary	102742	79480	16475	4817	100772	1970	95919	590	6233	30528	21793	26917	14263	9234	23019	26574	28393	24756	21581	19712	18228	20814

Source: SABINA, OeNB, own calculations.

Note: Definitions are given in the text.



Table A2.2

**Number of Austrian nonfinancial corporations in the sample**

	Total				Legal form		Age (years)				Opacity (quartiles)				Tangible assets ratio (quartiles)								
	Size				large	AG	KG	up to 4	5-9	10-19	20-29	30+	1	2	3	4	1	2	3	4			
	micro	small	me- dium	KMU		GmbH	AG																
<b>Technology-intensity</b>																							
<i>Manufacturing</i>																							
High	486	299	111	43	453	33	463	7	16	120	80	156	66	63	231	129	80	46	109	171	134	25	
Medium-high	2,235	1,334	444	280	2,058	177	2,050	27	158	376	346	648	460	405	1,185	562	263	225	386	662	752	170	
Medium-low	3,991	2,659	891	301	3,851	140	3,651	22	318	734	640	1,153	788	675	2,021	1,017	549	404	470	975	1,527	602	
Low	4,064	2,863	802	286	3,951	113	3,574	24	466	694	658	1,048	878	786	2,033	970	520	541	363	766	1,592	790	
<i>Services</i>																							
High-tech knowledge-intensive	6,926	6,145	580	142	6,867	59	6,644	55	227	2,439	1,618	2,015	596	258	1,630	1,969	2,102	1,225	2,386	1,951	1,051	336	
Knowledge-intensive	32,923	26,056	4,393	1,523	31,972	951	31,492	336	1,095	9,972	7,908	9,686	3,564	1,791	5,636	8,281	10,120	8,886	8,211	6,628	4,496	2,984	
Less knowledge-intensive	62,893	47,279	11,502	3,152	61,933	960	57,783	199	4,911	18,117	12,267	15,216	10,103	7,185	15,753	16,324	16,171	14,645	10,984	11,133	12,681	17,494	
High-tech	7,412	6,444	691	185	7,320	92	7,107	62	243	2,559	1,698	2,171	662	321	1,861	2,098	2,182	1,271	2,495	2,122	1,185	361	

Source: SABINA, OeNB, own calculations.

Note: Definitions are given in the text.

# Challenges for measuring inflation in a digital world from a monetary policy perspective

Doris Ritzberger-Grünwald, Fabio Rumler<sup>1</sup>

Refereed by: Bernhard Goldhammer, ECB

Apart from having been a major driver of subdued inflation developments in most industrialized countries in the past 10–15 years, recent key megatrends in the retail industry, such as globalization and digitalization, also pose a number of new challenges for measuring inflation. This article discusses possible effects of growing Internet use on prices, inflation and official price statistics. There is some evidence that the growing importance of e-commerce in recent years has had a dampening effect on both online and offline prices, although this effect is likely to be small and only temporary until the spread of the internet has stabilized.

To account for the changing consumption habits resulting from web retailing, the methods and procedures for inflation measurement have to be adjusted to the new conditions. Systematically collecting data from online retailers (through web scraping) in addition to monitoring prices at brick-and-mortar stores and expanding monitoring to include smaller towns and rural areas would reflect new consumption habits and improve the representativeness of the price index. The use of scanner data directly obtained from retailers, furthermore, would allow for a joint analysis of prices and quantities sold, which in turn helps reduce the substitution bias present in conventional price statistics.

At the same time, a long-standing issue remains to be solved in inflation measurement: Although the costs of owner-occupied housing account for a considerable share of the total cost of living of households, they are still not included in the consumer price indices of European countries due to methodological complexities. In this respect, experimental evidence indicates that – under normal circumstances – including these costs in official price statistics will most likely not change the euro area inflation figures by much.

JEL classification: E31, C43

Keywords: digitalization, inflation measurement, owner-occupied housing, scanner data

The Eurosystem's primary objective of maintaining price stability, as stipulated in Article 127 of the Treaty on European Union, sounds rather simple and straightforward. Ultimately, it took a couple of years to arrive at a common and stable understanding of the best definition of price stability. The initial definition agreed at the start of monetary union was: "Price stability must be maintained according to the Eurosystem's published definition, so that year-on-year increases in the Harmonized Index of Consumer Prices (HICP) for the euro area are below 2%." A review of the monetary policy framework a few years on brought a less prominent role for the reference value and a balanced role for the two pillars of analysis (i.e. monetary and economic analysis)<sup>2</sup> as well as a fine-tuning of the price stability definition. To make clear that "below 2%" does not include zero or values close to

<sup>1</sup> Oesterreichische Nationalbank, Department of Economic Analysis and Research, [doris.ritzberger-gruenwald@oenb.at](mailto:doris.ritzberger-gruenwald@oenb.at); Economic Analysis Division, [fabio.rumler@oenb.at](mailto:fabio.rumler@oenb.at) (corresponding author). The views expressed in this paper are exclusively those of the authors and do not necessarily reflect those of the OeNB or the Eurosystem. The authors would like to thank the members of the ESCB Working Group on General Economic Statistics (WGGES), in particular, Karin Wagner (OeNB) for helpful comments and valuable suggestions and Raphael Neuwirth for research assistance as well as Ingeborg Schuch and Anita Roitner for language support.

<sup>2</sup> To analyze the prospects and risks for price stability, the ECB uses a two-pillar strategy. The first pillar consists of the economic analysis, which examines movements in output and demand, unemployment, price and cost indicators, etc. The second pillar is monetary analysis, which considers the supply and demand for monetary aggregates and credit. The ECB evaluates and cross-checks the information from these pillars to formulate its monetary policy decision.

zero, the target for inflation was redefined in May 2003 as allowing euro area HICP inflation rates of “below, but close to 2% over the medium term.”

The concept of aiming at inflation rates of “below, but close to 2% over the medium term” was praised but also criticized right from the beginning. Praised by those who appreciated the inherent flexibility giving the Governing Council of the ECB some leeway in its decision-making, and criticized by those who would have preferred a more precise benchmark for measuring the achievement of or failure to achieve the price stability objective.

As long as the inflation rate of the euro area hovered around 2%, in the years before the financial crisis, there was relatively little debate about the definition of price stability. After 2008 and during the financial and economic crisis, the debate intensified, becoming more muted only when the HICP dropped into negative territory and fueled fears of ending up in a deflationary spiral (as was the case in 2009 and again in 2015). The definition of price stability was hotly debated in particular during the period when inflation rates continued to remain persistently low after years of monetary policy accommodation, including the implementation of a set of nonstandard monetary policy measures with a view to spurring inflation. After all, euro area inflation had reached only 0.5% on average by 2016 despite all those measures.

Economists inside and outside the Eurosystem have tried to establish why inflation reacted so slowly to the vast amount of liquidity which was poured into the market. One stream of arguments focused on the transmission channel, which did not seem to work properly: Trust in the functioning of the money market was still missing, banks had to recapitalize and were hesitant to lend, and firms and households were highly leveraged and also not in a position to take up new loans. As a result, credit growth, investment and consumption were low even despite negative interest rates.

Another stream of arguments put the blame on structural changes which may have altered the inflation process. Globalization may have increased competition, and digitalization, shopping online in particular, may have eroded the traditional price-setting mechanism, dampening price increases as well. In addition, measurement issues came up, as it was believed that online prices were not being taken into account properly.

The various Eurosystem working groups that dealt with this topic ultimately provided good reasons against opening Pandora’s box and changing the price stability goal in times when it was difficult to reach. Moreover, euro area inflation did bounce back eventually and has reverted to a level of 1.7% in 2018. Thus, renewed compliance with the price stability goal has come within reach, also supported by rising energy prices. As a result, the ECB’s Asset Purchase Programme (APP) was terminated in December 2018, with high levels of liquidity provision to be retained for the time being through the reinvestment of maturing bonds. In other words, the HICP measurement debate has lost some steam in the euro area recently – but this notwithstanding, the question as such remains and continues to be high on the agenda of others and in other countries.

The inflation measurement debate actually dates back to the 1990s. The literature of the 1990s, most prominently the report of the Boskin Commission (1996), identified four major sources of bias in inflation measurement:

- the bias resulting from the use of a fixed-weight index formula (product substitution bias),

- the bias due to missing or inappropriate quality adjustment of prices (quality change bias),
- the bias resulting from a delayed consideration of new products (new product bias),
- the bias due to insufficient consideration of changes in the retail structure (outlet substitution bias).

The Boskin Commission (1996) estimated that due to these biases annual inflation in the U.S. was overstated by about 1.1 percentage points.

In the meantime, new statistical methods have been introduced to reduce or even eliminate these biases. Statistics Austria, for instance, has been updating the composition and the weights of its consumption baskets at annual intervals since 2010, with a view to reducing new-product and product-substitution bias. Furthermore, Statistics Austria has been frequently adjusting the structure of the surveyed outlets to reflect the actual outlet preference of consumers, given the rising importance of discounters and online sellers, and has introduced various methods for adjusting prices for quality changes, like hedonic regressions.

However, given new trends like globalization and digitalization, new challenges have appeared in inflation measurement in the past 10–15 years. In section 1 of this article, we will discuss how the rise of the Internet, and the possibility of purchasing goods and services online (also across borders) in particular, have affected prices and inflation. Furthermore, a rather long-standing, but still unresolved issue in inflation measurement is the integration of the costs of owner-occupied housing (OOH) into official price statistics. Even though OOH accounts for a considerable share of the total cost of living of households, it is mostly not included in the consumer price indices of European countries, which will be discussed in section 2. In section 3, we will analyze how the availability of new data sources through digitalization affects the measurement of inflation and make a few suggestions for future improvements. Section 4 concludes.

## 1 The effects of e-commerce on prices and inflation

In this section, we will discuss only the direct effects of digitalization on prices as a result of the rise in sales of goods and services through the Internet, neglecting possible indirect effects of the advancement of IT on the cost structure of companies and total industries.<sup>3</sup>

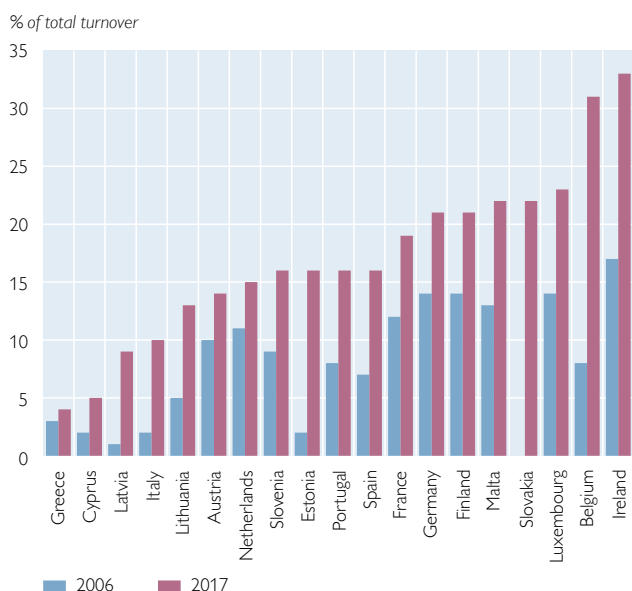
Over the past 10 years, the share of electronic sales to consumers and businesses in the total turnover of enterprises has increased in all euro area countries, but still varies significantly across them (see chart 1, left panel). In 2017, the highest shares of electronic sales were reported by enterprises in small and open economies like Ireland, Belgium, Luxembourg, Slovakia, Malta and Finland, followed by companies in Germany, France, Spain and Portugal. At the same time, the shares of electronic sales were still comparatively low in Greece, Cyprus, Latvia and Italy, with values below 10%. The lower shares of e-commerce in these countries may be partly explained by a considerably larger share of small and medium-sized enterprises, which tend to generate a smaller share of their turnover from web sales than larger firms. In the 2006–2017 period, digital sales soared above all in countries that joined the euro area later than its founding members; namely in Estonia, Lithuania,

<sup>3</sup> Other effects resulting from IT advancements that may eventually feed into prices include the impact that progress in IT is likely to have had on firm productivity and labor markets (see Coffinet and Perillaud, 2017).

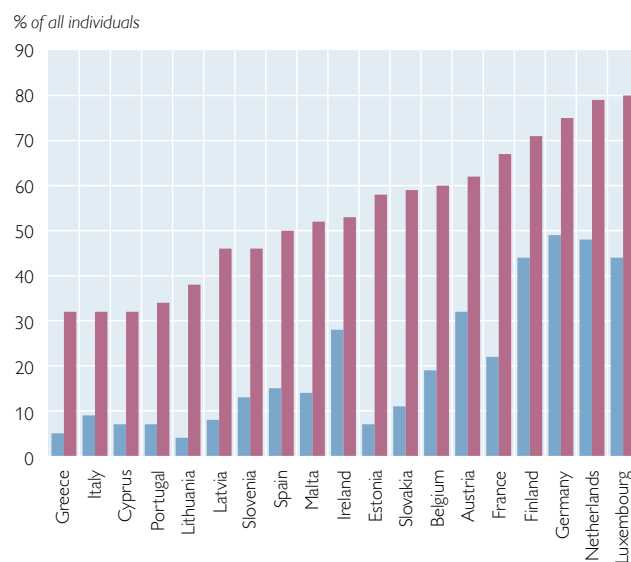
Chart 1

## E-commerce by enterprises and individuals

### Internet sales (excluding sales by financial institutions)



### Individuals ordering goods and services online



Source: Eurostat.

Latvia, Cyprus and Slovakia, which – according to Eurostat information not shown in the chart – have seen a significant expansion in high-speed Internet coverage and where digital sales started from low levels in 2006. This compares with a relatively small increase in the share of digital sales for Austria in the past 12 years, namely from 10% in 2007 to 14% in 2017.

Turning to the customer perspective of e-commerce, the share of individuals using the Internet to obtain information on goods and services and make purchases online has increased considerably over the past 10 years (see chart 1, right panel). By 2017, the share of individuals who had bought and ordered goods and services online during the past 12 months exceeded 40%, except in Greece, Italy, Cyprus, Portugal and Lithuania. In most euro area countries, this percentage at least doubled between 2006 and 2017. In terms of the percentage of people purchasing goods online, Austria is among the top six countries in the euro area, reaching a share of 62% in 2017.

The growth in e-commerce can have direct effects on prices through two major mechanisms (Coffinet and Perillaud, 2017). First, compared to the standard brick-and-mortar-based distribution channels, e-commerce provides scope for cost savings (e.g. lower costs for logistics, marketing, etc.) in the wholesale and retail markets, which both traditional and online retailers can pass on to their customers. Second, e-commerce can lower prices because of increased competition among suppliers, as customers can easily search the Internet for the best bargain and thus force both traditional and online suppliers to keep their prices low. Increased competition among online retailers also affects price setting in classical brick-and-mortar stores, putting downward pressure on prices in the whole retail sector. However, the effect on prices is likely to be only temporary until the spread of e-commerce and conditions on online markets have stabilized (Meiyers, 2006). Furthermore, including

digitally-traded goods and services in inflation measurement would affect inflation only to the extent that online prices change at different rates compared to the prices of offline-traded goods and services.

Available empirical evidence on the existence of measurement errors in consumer price indices due to the incomplete coverage of online sales is still scarce and inconclusive. Comparing online and offline prices for household appliances in 21 EU countries, Duch-Brown and Martens (2014) find that online prices are on average lower than offline prices. At the same time, there is a large degree of heterogeneity across products, with some products even showing higher prices online than offline. From the cross-section of prices, they estimate the price elasticity of demand for each product and find that the elasticity of online prices is generally more pronounced than for offline prices, indicating that product substitution is probably stronger on online markets. Lorenzani and Varga (2014) estimate that a further increase in e-commerce will lower price increases in the retail sector by 0.5 percentage points per year in the EU-27. Newer evidence from a cross-country study based on 56 large multi-channel retailers (Cavallo, 2017) as well as from online shopping platforms in the U.S. and U.K. (Gorodnichenko et al., 2014) suggests that differences in online and offline prices are negligible and thus do not affect inflation. In contrast, evidence from millions of online transaction prices in the U.S. supplied by Adobe Analytics suggests that the inflation rate of products sold online is somewhat smaller than that of the same products sold offline (Goolsbee and Klenow, 2018).

As of December 2018, a new EU regulation (2018/302) outlawed geoblocking in e-commerce, i.e. preventing online customers from shopping in other EU countries at the same conditions as local costumers. With the possibility of unrestricted online trade within the whole EU, competition on online markets is expected to intensify further, possibly leading to a further reduction in prices in cross-border e-commerce. However, according to consumer protection organizations, the effect should not be huge because there are still a number of exceptions from the new regulation, in particular for electronic products where online trade is quite strong. Moreover, the new regulation does not imply an obligation for online sellers to ship their goods to all EU countries, which in reality still acts as a barrier to free online trade in the EU.

## 2 Integrating the costs of owner-occupied housing into the HICP

The inclusion of owner-occupied housing (OOH) into the HICP is a widely debated and still unresolved issue. So far, housing expenses are included in the consumer price indices of euro area countries predominantly in the form of direct rents paid. The weights of rents in the HICP, however, vary considerably across countries (ranging from below 1% in Slovenia to more than 10% in Germany in 2018). The housing expenses of house owners are not included in the HICP of the euro area countries. In the U.S., where such expenses are included in the CPI in the form of imputed rents, they have the highest weight of all product groups in the U.S. CPI (22%).

A crucial question in the debate about including the costs of OOH is whether housing should be treated as a consumption good or an investment good. If housing is treated as a consumption good it would need to be included, as the HICP has to capture all goods and services (above a certain threshold) that are acquired and consumed by households. However, in many cases properties and houses are bought

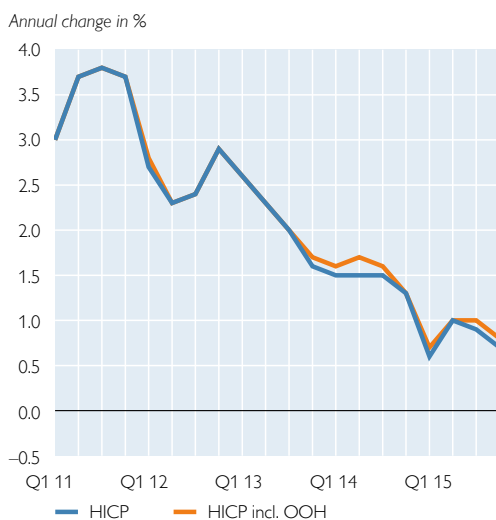
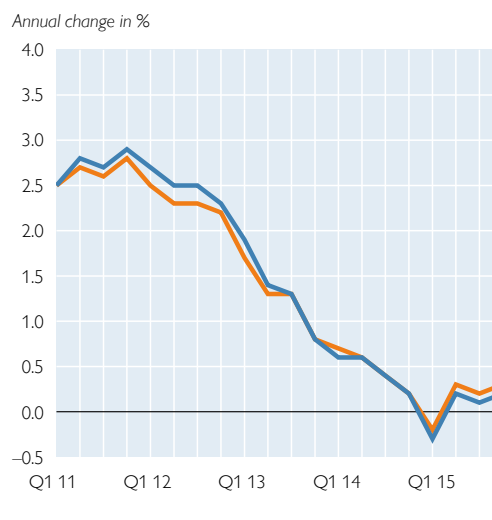
with an investment motive, which implies that these homes should be considered investment goods. It is precisely on account of this argument that OOH has been excluded from the HICP in the past.

Eurostat started publishing separate owner-occupied house price indices (OOHPI) in 2016, based on EU regulation 2016/792 on harmonised indices of consumer prices and the house price index. This regulation states in Article 2(9) that “changes in the transaction prices of dwellings new to the household sector...” – which corresponds to the net acquisition approach – should be used to calculate the OOHPI. This approach captures the transaction costs of property purchases plus purchase-related expenditures plus maintenance and major repairs. The OOHPI indices are calculated on a quarterly basis. Ultimately, including an OOHPI in the HICP would be problematic for three reasons. First, the quarterly OOHPI frequency would have to be converted somehow to the monthly frequency of the HICP. Second, land prices, which have an asset price element and should therefore not be part of the HICP, are implicitly included in the OOHPI. Third, the net acquisition approach, which would need to be used for HICP purposes as required by the respective provisions, is quite complex and entails a number of computational difficulties. Other approaches are the rental equivalence approach, as used in Japan and the U.S. and the user-cost approach, as used in Canada and Sweden; but they are at odds with the HICP legal framework.<sup>4</sup>

For these three reasons, OOH has not been included in the HICP in the past. In the light of methodological improvements concerning OOH in the past years, the European Commission reviewed the arguments underlying the decision to exclude OOH from the HICP during 2018. After consulting Eurostat and the ECB, the Commission issued its final decision in November 2018, confirming the exclusion of OOH from the HICP of euro area countries due to the three counter-arguments mentioned before (European Commission, 2018). At the same time, the Commission emphasized that although “the OOHPI is *currently* not suitable for integration into the coverage of the HICP... the Commission will pursue the methodological work required for the integration of the OOHPI *in the future*.” We understand from this that efforts to integrate OOH into official price statistics are ongoing, which is why we do not come back to this issue in our suggestions for improvements of inflation measurement in the next section.

Still, the question remains as to whether this decision by the Commission means that the HICP without OOH is severely biased. At the ECB, the effect of including OOH in the HICPs of individual euro area countries has been estimated in an internal exercise. These estimations reveal that annual growth rates of the HICP estimated with and without OOH would differ only marginally. The average and the maximum absolute impact of including OOH on annual HICP inflation in the euro area over the 5-year period considered in the exercise (Q1 2011 to Q4 2015) is less than 0.05 percentage points and 0.2 percentage points, respectively (see

<sup>4</sup> *The user-cost approach measures the changes in the cost to owner-occupiers of using the dwelling and includes repairs and maintenance, insurance, fees, mortgage interest and depreciation. It is less suitable for the inclusion in the HICP because it uses imputed cost measures and it includes interest payments which are directly influenced by monetary policy. The rental equivalence approach relies on the imputed price for the use of the owner-occupied dwelling that is equivalent to the rental price of the dwelling. However, this approach is also not suitable for the HICP because it follows a notional concept by using imputed rather than transaction prices, which would be required for the HICP.*

**HICP including and excluding OOH****Austria****Euro area**

Source: Eurostat and internal ECB estimates.

chart 2). For Austria, the impact over the same period is 0.0 percentage points on average, the maximum absolute impact being 0.1 percentage point. Larger impacts have been reported for countries with periods of more dynamic house price developments. In Spain, for instance, where a strong decline in house prices occurred from 2011 to mid-2013, the impact of including OOH in the HICP on annual inflation is on average  $-0.4$  percentage points, with a maximum absolute impact on annual inflation in 2012 of  $-1.2$  percentage points.

**3 Suggested improvements for inflation measurement in the future**

The changes in the behavior of consumers induced by the Internet but also the availability of new digital data require modifications in the methods and procedures for measuring inflation to increase the quality and representativeness of price statistics. These include measures which have been discussed in the literature and are already in the pipeline in a number of countries, but also new measures that help to improve price statistics. Accordingly, national statistical institutes (NSIs) should:

1. Use scanner data from supermarkets and specialist retailers in inflation measurement.
2. Include web-scraped data from online retailers in price statistics.
3. Expand the regional dimension of price data and publish regional inflation rates.
4. Publish timely flash estimates of monthly HICP inflation rates.

We will now discuss each of these suggestions in turn.

**3.1 Collecting scanner data allows for a joint analysis of prices and quantities sold**

Scanner data are data obtained by scanning the bar codes of individual products at electronic points of sale in retail outlets. They usually provide detailed information on the prices, quantities, characteristics and values of goods sold. To use scanner data in inflation measurement, they have to be released by the retailers who own



them. Yet retail chains may be reluctant to share their scanner data due to confidentiality and competition concerns. There would be a chance to include an obligation for retail companies to provide scanner data for statistical purposes (subject to confidentiality) in the new CPI regulation that is currently under review in Austria. In some European countries, notably in Belgium, Iceland, Italy, Luxembourg, the Netherlands, Norway, Slovenia and Switzerland, scanner data from supermarkets and specialist retailers are already used in inflation measurement, at an experimental level and for cross-checking the prices that are collected at brick-and-mortar stores.

The big advantage of scanner data is that they include actual transaction prices, which capture price rebates at the customer level (which may be different from posted prices), and quantities sold. This makes it possible to measure product substitution when relative prices of products change and, as a result, to reduce the product substitution bias mentioned above. By their nature of large and comprehensive data sets, scanner data would also improve the representativeness of price statistics as they allow price developments for individual products to be averaged over different varieties as well as over a number of days within the observation period (rather than just on due dates). They also come with the promise of making the collection of prices in stores less important in the future, thus reducing the costs of inflation measurement.

For economic research, scanner data are especially valuable as they allow researchers to estimate demand elasticities of individual products and to analyze the importance of sales prices in retailing. However, a drawback of scanner data is that they require large computing and time resources for storage, cleaning and processing. Furthermore, the best index calculation formula to integrate scanner data into the HICP is still not agreed upon (see Eurostat, 2017).

### **3.2 Collecting online retailing prices (web scraping) reflects the rising importance of e-commerce**

Web scraping denotes the automatic download of (large quantities of) data from the Internet for the purpose of data analysis. In the context of price data, this means scraping the websites of online retailers at high frequencies (at daily intervals or even more frequently) to collect the prices of the products offered. Automatic retrieval of price data from the websites of online sellers requires a special software but also regular interactive maintenance of the automatic downloads to deal with changes in the addresses or designs of sellers' websites.

Given that e-commerce has gained significant importance in many countries, as shown above, online prices should be included in inflation measurement to the extent goods and services are purchased online (in Austria roughly 14% in 2017). In Austria, the prices of some goods and services are already collected on the Internet (including e.g. electricity, flight tickets, cigarettes), but they are retrieved from the suppliers' websites on a case-by-case basis. The prices charged by online retailers, which – due to the large quantity required – would have to be downloaded automatically, have not been included in Austrian price statistics so far.

Web-scraped data share some of the advantages of scanner data in inflation measurement. Including them would enhance the representativeness of price statistics by accounting for the changing consumption habits of households, who are buying increasing amounts of goods and services online. It would also allow to calculate and analyze price trends at a higher frequency than with data normally collected

on due dates.<sup>5</sup> However, there are legal limitations to web scraping as the firewalls of online retailers may identify web-scraping activities as intrusion and block any further access and download. Another limitation for the use of web-scraped data in the HICP is that no weighting information can be inferred from the data as quantities purchased are usually not available.

In fact, Statistics Austria is currently undertaking a pilot project to include web-scraped data in official price statistics. The plan is to systematically download data from the websites of food stores, consumer electronics retailers and drugstores, using an automatic procedure programmed in the statistical software R. In order to overcome the legal problems, Statistics Austria intends to seek an agreement with the retailers for setting up a procedure in which their access is identified as an official download for the purpose of price statistics and limited to hours with usually low customer activity (late evenings and night hours) so as not to affect website performance. Apart from Statistics Austria, statistical institutes in Belgium, Germany, the Netherlands and the U.K. are experimenting with the use of web-scraped data in inflation measurement, but – to the best of our knowledge – web-scraped data have been included in CPI calculations in a regular and significant fashion only in the Netherlands.

### **3.3 Collecting prices in small and rural communities increases CPI/HICP representativeness**

Depending on the nature of the product, NSIs survey the products and services included in the HICP either centrally (on the Internet or by direct inquiry) or locally in retail and service outlets. For instance, public fees, regulated prices of public utilities but also airfares and prices of public transport are mostly collected from the Internet, while the prices of most durable and nondurable goods are collected locally in retail outlets.

The regulation governing the Austrian CPI and HICP (Verordnung über die Erstellung von Verbraucherpreisindizes – Federal Law Gazette Part II No. 457/2015) stipulates that the prices of the locally surveyed products are to be collected only in 20 major cities of Austria. This is due to historical practice and serves to contain the costs of price collection, which are borne by the municipalities.

The Austrian CPI regulation is currently being revised. In this context, it would be advisable to increase the number of cities and towns where prices will be collected in the future. This would provide a more representative picture of price developments in Austria, as small towns and rural areas are not covered by the collection framework so far. This is particularly troublesome as a significant part of GDP in the service sector is generated in rural tourist areas.<sup>6</sup>

From both the perspective of economic research and of monetary policy the coverage of smaller communities in price statistics would allow us to assess regional price trends and to learn from local developments about global issues. Furthermore, regional price data, which would also be more easily (and less costly) available from

<sup>5</sup> *The Billion Prices Project* conducted by the MIT uses web-scraped data from 11 countries to calculate daily consumer prices indices. For more information see: <http://www.thebillionpricesproject.com/>.

<sup>6</sup> In *Roitner and Rumler (2017)* it is argued that the strong tourism industry in Austria is one of the factors why the weight of accommodation and catering services in the Austria HICP is comparatively larger than in other euro area countries. This difference is expected to grow even further if rural tourist areas will be included in the price collection for the Austrian CPI/HICP.

the new digital data sources, allow analyzing interesting research questions such as price trends in border regions, differences in price dynamics in small vs. large towns, in rural vs. urban areas, in rich vs. poor areas, etc. As a result, regional inflation rates (for individual provinces) could be published by Statistics Austria to complement the data available for regional macroeconomic analysis.

### 3.4 Publishing flash estimates of monthly HICP inflation rates

All euro area NSIs produce flash estimates of monthly inflation rates shortly after the collection of prices has been finished and report the results to Eurostat. These estimates are basically the results of a preliminary calculation of HICP inflation rates before the data have been double-checked. Eurostat then constructs a flash estimate for the euro area by aggregating national flash estimates and publishes it regularly on the last working day of the month. The official final inflation rates are published in the middle of the following month but only rarely deviate from the flash estimate (and normally by no more than 0.1 percentage point).

The publication of the national flash estimates is voluntary and remains in the responsibility of the NSIs. Currently, all NSIs in the euro area with the exception of those in Belgium, Estonia, Ireland, the Netherlands and Austria publish their flash estimates on their websites or allow publication by Eurostat. With the implementation of new price collection methods like scanner and web-scraped data in inflation measurement, the production of early estimates of inflation should become easier and less time consuming, which would allow the flash estimates to be available in a better quality and facilitate publication. Thus, given that inflation figures are almost never revised, the OeNB would highly welcome if Statistics Austria were to start publishing monthly flash estimates like other countries do, for three reasons. Monthly flash estimates would (i) inform the general public about the latest price trends in a timely way, (ii) facilitate the forecasting process of inflation in the short run by providing additional observations, and (iii) remove the asymmetric information lag of national inflation rates within the euro area.

## 4 Conclusions

The changes in the retail sector induced by digitalization, the rise of e-commerce in particular, over the last 10–15 years have had a noticeable effect on retail prices and on the sales performance of retail companies. There is some evidence that the growing importance of e-commerce has had a dampening effect on both online and offline prices, although this effect is likely to disappear once the spread of e-commerce has stabilized. To account for the changing shopping habits of consumers resulting from digitalization, the methods and procedures for measuring inflation have to be adjusted to the new conditions. In addition, digitalization stimulates the availability of new (digital) data sources which should be exploited for inflation measurement. Collecting data from online retailers (through web scraping) in addition to monitoring brick-and-mortar stores as well as expanding monitoring to include smaller towns and rural areas (in addition to the 20 largest cities) would not only reflect more recent consumption habits but also improve the representativeness of the price index. Using scanner data directly obtained from retailers would furthermore allow for a joint analysis of prices and quantities sold, thus allowing the substitution bias present in conventional price statistics to be estimated and reduced.

Various NSIs in the EU have already undertaken preparatory work to include scanner and web-scraped data in inflation measurement and these activities will most likely be extended in the future. If the remaining challenges concerning the use of these data sources (such as high attrition rates and the need for big-data know-how) can be overcome, the regular calculation of inflation rates could be based to a significant extent on scanner and web-scraped data. This would reduce the need for price collection in conventional stores to a large extent and, as a result, increase the efficiency and the quality of inflation measurement in the future.

Apart from the new challenges for inflation measurement posed by digitalization and globalization, a rather long-standing and widely debated issue remains unresolved: the costs of owner-occupied housing are still not included in official price statistics even though they account for a large share of total household expenses. The main reason is that none of the approaches at hand to calculate/estimate the regular costs of house owners for living in their houses is completely compatible with the legal HICP framework. Efforts are ongoing at Eurostat – in cooperation with the ECB and the European Commission – to pave the way for eventually integrating OOH into the HICP, but so far, no satisfactory solution has been found. Especially from a policymaker’s perspective, including the costs of OOH in inflation measurement would be desirable as they are more directly affected by monetary policy decisions (through interest payments on mortgages) than any other component in the HICP, even though experimental evidence would imply that including these costs in official price statistics will most likely not change the euro area inflation figures by much.

## References

- Boskin M., E. Dulberger, R. Gordon, Z. Griliches and D. Jorgenson. 1996.** Towards More Accurate Measure of the Cost of Living. Final Report to the Senate Finance Committee from the Advisory Commission to Study the Consumer Price Index. Washington DC.
- Cavallo, A. 2017.** Are Online and Offline Prices Similar? Evidence from Large Multi-Channel Retailers. In: *American Economic Review* 107(1). 283–303.
- Coffinet, J. and S. Perillaud. 2017.** Effects of the Internet on Inflation: an Overview of the Literature and Empirical Analyses. Unpublished manuscript.
- Duch-Brown, N. and B. Martens. 2014.** Consumer Benefits from the EU Digital Market: Evidence from Household Appliances Markets. JRC Technical Reports. Digital Economy Working Paper 2014/03.
- European Commission. 2018.** Report from the Commission to the European Parliament and the Council on the Suitability of the Owner-Occupied Housing (OOH) Price Index for Integration into the Harmonised Index of Consumer Prices (HICP) Coverage. <http://ec.europa.eu/transparency/regdoc/rep/1/2018/EN/COM-2018-768-F1-EN-MAIN-PART-1.PDF>.
- Eurostat. 2017.** Harmonised Index of Consumer Prices. Practical Guide for Processing Supermarket Scanner Data. European Commission, Eurostat. September 2017. <https://circabc.europa.eu/sd/a/8e1333df-ca16-40fc-bc6a-1ce1be37247c/Practical-Guide-Supermarket-Scanner-Data-September-2017.pdf>.
- Goolsbee, A. and P. Klenow. 2018.** Internet Rising, Prices Falling: Measuring Inflation in a World of E-Commerce. NBER Working Papers 24649. May.
- Gorodnichenko, Y., V. Sheremirov and O. Talavera. 2014.** Price Setting in Online Markets: Does it Click? NBER Working Papers 20819. August.

- Lorenzani, D. and J. Varga. 2014.** The Economic Impact of Digital Structural Reforms. European Commission Economic Papers 529. September.
- Meijers, H. 2006.** Diffusion of the Internet and Low Inflation in the Information Economy. In: Information Economics and Policy 18(1). 1–23.
- Roitner, A. and F. Rumler. 2017.** Worauf lässt sich der persistente Inflationsabstand Österreichs zum Euroraum und zu Deutschland zurückführen? Box 1 in Inflation Aktuell – die Inflationsanalyse der OeNB Q4/17.

# Exploring supply and demand-driven imbalances in Austria's housing market

Martin Schneider<sup>1</sup>

Refereed by: Wolfgang Amann, Institut für Immobilien, Bauen und Wohnen GmbH, Vienna

*This article explores supply and demand imbalances in Austria's housing market over time. In the period under review, which starts in 1980, excess demand for housing emerged in the early 1990s and peaked in 1993, when demand exceeded the number of available housing units by a number of 41,000. A construction boom in the late 1990s tipped the market back toward excess supply, which rose to 27,000 homes until 1998. By 2016, a combination of shrinking household sizes, rising net migration and weak construction activity had created another peak in excess housing demand, with demand exceeding supply by 65,000 homes. Since 2017, Austria's housing market has been easing again. Increased construction activity and weaker demand are expected to eliminate backlog demand by 2020. With the growth rates of household numbers decreasing steadily, housing demand will continue to weaken until 2030.*

*JEL classification: R21, R31*

*Keywords: housing market, supply, demand, excess demand*

Data on housing supply and demand are key indicators for the real estate market. They imply whether the market may be heading toward excess demand and hence a housing shortage, or whether housing production exceeds demand, thus possibly creating more housing vacancies. Projections of housing demand are needed for numerous purposes. They provide important input for spatial planning. They are relevant for estimating the quantities of construction units required and the resulting demand for housing loans. And they are useful for estimating trends in real estate prices. Bank Austria (2017), for instance, estimated that Austria had a housing need of 60,000 units in 2017 and expects that some 45,000 to 50,000 new homes will need to be built each year to fulfil Austria's long-term housing need. This compares with a housing need of slightly more than 60,000 homes per year identified by the Austrian Institute for Real Estate, Construction and Housing (Institut für Immobilien, Bauen und Wohnen GmbH – IIBW).

The aim of this paper is to explore the housing supply-and-demand balance in Austria with a special focus on housing demand. The paper is organized as follows. Section 1 provides definitions of housing demand and housing need, while section 2 offers a detailed discussion of the components of demand for housing in Austria, covering the period from 1980 to 2030. Section 3 provides estimates of the housing supply based on housing completion data collected by Statistics Austria, as adjusted for incomplete coverage of construction activity. A detailed description of these adjustments is included. Section 4 compares total housing demand with total housing supply and calculates the resulting backlog demand and the associated housing vacancy rates. Section 5 discusses the main results.

<sup>1</sup> The author wishes to thank Wolfgang Amann, Eva Bauer, Ernest Gnan, Walpurga Köhler-Töglhofer and Günter Wolf for valuable comments and suggestions. Any remaining errors are those of the author. An earlier version of this article was published as Schneider (2019a).

## 1 Definition of housing demand and housing need

In the literature, *housing demand* and *housing need* are often used synonymously, even though the two terms are based on different concepts. Generally speaking, there are *economic concepts* and *urban and regional planning concepts*. The *economic concepts* of housing demand are *positive concepts*, as they use variables such as demographics, house prices, income or interest rates to explain housing demand.<sup>2</sup> *Urban and regional planners* identify the normative need for socially desirable housing and forecast future housing needs.

*Housing need* is a normative concept, which means that a given housing need is identified by comparing the living conditions of individuals or households with normatively derived standards. Any shortfall from these standards indicates a need for additional housing<sup>3</sup> and serves as the basis for estimating the level of socially desirable housing.

However, the term housing need is not used exclusively for the normative identification of a desired level of housing. Many forecasts use housing need synonymously with housing demand. Moreover, forecasts tend to include positive and normative features, and they reflect demographic forecasts as well as projections for household size, income, vacancy rates and replacement needs as a result of depreciation.<sup>4</sup> Housing demand forecasts are often made at a highly disaggregated level. A case in point is the housing demand forecast published by the Austrian Conference on Spatial Planning (Die Österreichische Raumordnungskonferenz – ÖROK) in 2005.

## 2 Components of housing demand in Austria

This section seeks to quantify demand for housing in Austria for the period from 1980 to 2030 in terms of the annual changes in demand (rather than in terms of absolute figures). The key data source for this exercise is the annual change in the number of households until 2030, as published by Statistics Austria in its 2018 projections. For the purpose of our analysis, we decompose the respective changes in the number of households – and thus the respective changes in the number of main residences – into different drivers of change (household size, net migration and residual). Apart from main residences, we also look at demand for secondary residences, changes in vacancy rates and the net loss of housing. Thus, the analysis at hand broadly follows the method used by ÖROK in its 2005 housing demand forecast.<sup>5</sup>

<sup>2</sup> Zabel (2003) divides the economic literature on housing demand into four categories: (1) papers modeling aggregate housing demand as a function of house prices, household spending not related to housing costs, and other socio-economic variables; (2) papers discussing housing demand on the basis of specific housing attributes; (3) papers modeling tenure choice (“rent or buy”); and (4) papers addressing the issue of locational choice.

<sup>3</sup> Bramley et al. (2010) identified and defined seven distinct needs categories or drivers of housing need: (1) concealed households, i.e. adults who continue to live with their families; (2) sharing households; (3) unsuitable accommodation, in particular in the case of elderly or disabled people with mobility problems living in inappropriate dwellings; (4) overcrowding, as measured in terms of the “bedroom standard” or in terms of house size in relation to the number of household members; (5) affordability problems, which arise when households are forced to spend more than a given share of the household income on housing; (6) homelessness; and (7) house condition.

<sup>4</sup> See e.g. Statistics Austria (2013), Henger et al. (2015).

<sup>5</sup> Some normative components, such as housing undersupply in quantitative and qualitative terms, or additional vacancies required to maintain the optimum vacancy rate (see section 2.3) were not taken into account.

## 2.1 Number of households

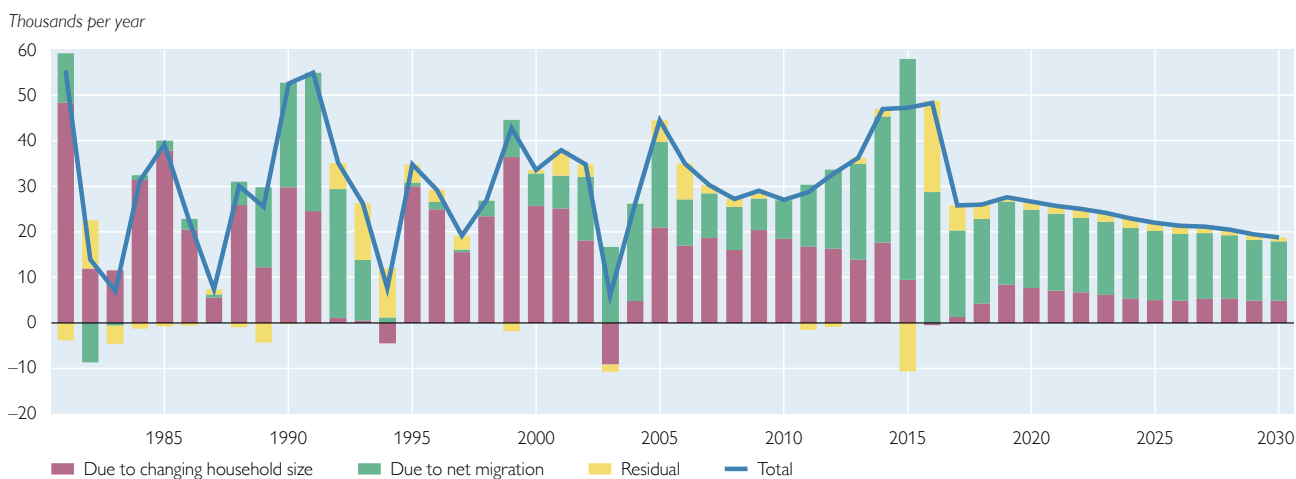
This section explores the changes in the number of households as a key driver of housing demand by decomposing these changes into a range of underlying factors. To begin with, the number of households is defined as the number of main residences. In micro census records, the number of households has corresponded to the number of main residences since 2001. Before 2001, several households sharing a given main residence were recorded as separate households. Given that realized demand for main residences is the relevant indicator for the present analysis, we equate the number of households with the number of main residences also for the period before 2001.

In the period from 1980 to 2010, the number of households increased by 29,800 per year on average.<sup>6</sup> This was followed by a marked increase in the annual growth rate in the period from 2011 to 2017 (38,000 households per year), with the number of additional households peaking at 48,300 in 2016. According to Statistics Austria's household projections from 2018, the number of Austrian households is expected to keep growing by 22,900 per year on average from 2019 to 2030. Over time, annual household growth is expected to decelerate; by 2030, the annual rate of household growth will have gone down to 18,700.

The decomposition<sup>7</sup> of household growth established the decreasing size of households as the single biggest driver of change. While Austrian households consisted of 2.55 people on average in 1990 (with the number of households corresponding

Chart 1

### Change in the number of households



<sup>6</sup> Changes to the conceptual framework of the micro census led to a break in the time series on the number of main residences in 2004. Therefore, the change from 2003 to 2004 was replaced with the average change in household numbers from 2005 to 2010.

<sup>7</sup> The contribution of household size was derived by subtracting the number of residents in year  $t$  as divided by the size of households in year  $t-1$  from the actual number of households in year  $t$ . The contribution of migration reflects the difference between the number of immigrants divided by the household size of non-Austrian citizens and the number of emigrants divided by the household size of Austrian citizens. The residual refers to the effect of domestic demographics and approximation errors resulting from assumptions about the household size of the migration component.



to the number of main residences), this figure had dropped to 2.26 by 2017.<sup>8</sup> In the 1990s, this decline alone accounted for 57% of the annual rate of household growth (averaging 31,100 per year). Further, close to one-third of the additional households can be traced back to net migration, leaving a fairly small residual of 12% (attributable mainly to domestic factors). The decline in household size subsequently decelerated in the 2000s.

This pattern has changed in recent years, though, reflecting the large additions to the population due to the liberalization of the Austrian labor market<sup>9</sup> and the high number of refugee arrivals in 2015. Thus, the number of households increased by 36,500 per year on average in the period from 2011 to 2018. Thereof, only 27% were attributable to shrinking household size, whereas net migration accounted for as much as 67%, which leaves an even smaller residual of 6%. Statistics Austria projects net migration

to continue to account for the bulk of household growth (67%) from 2019 to 2030 as well, while 26% are expected to result from the decreasing size of households.

The decline in household size has basically been driven by three trends, namely declining fertility rates, rising life expectancy and more one-person households. The decline in fertility has led to smaller families, and hence to a decline in the size of multi-person households.<sup>10</sup> Fertility rates were characterized by a steady decline from the 1960s onward (2.82 children per woman in 1963) until 2001 (1.33). This trend reversed in 2002, and by 2016, the annual fertility rate had rebounded to 1.53. As a result of shrinking fertility rates, multi-person households have since become smaller, decreasing from 3.25 individuals per household in 1991 to 2.95 in 2017. Rising life expectancy has driven up the number of senior citizens living in one-person or two-person households. Further drivers of shrinking household size include higher job mobility and current trends in society, such as the increasing number of couples living together apart. These trends aside, household numbers and hence also average household size are dependent on life cycle decisions. Moving out of one's parents' home, setting up home with one's partner, having children or moving into a care home all have a bearing on household numbers. Depending on age cohort size, the general trends may, however, be masked by different effects in some years.

<sup>8</sup> In urban areas, however, household size has been on the rise again since 2015.

<sup>9</sup> Austria fully liberalized its labor market first in May 2011 for citizens from eight Central, Eastern and South-eastern European countries (Czechia, Hungary, Slovenia, Slovakia and Poland as well as the three Baltic countries Estonia, Latvia and Lithuania) and then in January 2014 for Romanian and Bulgarian citizens.

<sup>10</sup> A decline in fertility feeds through to housing demand with a lag, as it only starts to affect demand until the point in time when the children of the smaller families start to leave their parental homes.

Table 1

### Decomposition of the change in the number of households

	Total	Change in household size	Net migration	Residual
	<i>Thousands or % of total changes per period</i>			
<b>1981–1990</b>				
Absolute figures	285	235	54	–4
Per year	28.5	23.5	5.4	–0.4
%	100	83	19	–1
<b>1991–2000</b>				
Absolute figures	311	178	95	38
Per year	31.1	17.8	9.5	3.8
%	100	57	31	12
<b>2001–2010</b>				
Absolute figures	298	150	123	25
Per year	29.8	15.0	12.3	2.5
%	100	50	41	8
<b>2011–2017</b>				
Absolute figures	292	79	194	18
Per year	36.5	9.9	24.3	2.3
%	100	27	67	6
<b>2018–2030</b>				
Absolute figures	275	72	185	19
Per year	22.9	6.0	15.4	1.6
%	100	26	67	7

Source: Statistics Austria, author's calculations.

Table 2

**One-person households in Austria**

	Up to 15 years	15 to 29 years	30 to 44 years	45 to 59 years	60 years and over	Up to 15 years	15 to 29 years	30 to 44 years	45 to 59 years	60 years and over
	% of all one-person households					% of age cohort				
1984	0.0	13.8	14.1	13.4	58.7	0.2	8.1	6.8	8.0	30.3
1991	0.0	14.5	16.0	14.8	54.8	0.2	8.9	8.1	9.3	30.5
2001	0.0	13.2	23.4	18.2	45.2	0.2	13.0	12.0	12.6	28.2
2005	0.0	13.1	23.8	19.9	43.2	0.2	15.0	14.4	15.1	29.7
2011	0.0	14.2	20.9	22.3	42.7	0.2	17.3	15.5	16.1	29.8
2017	0.0	11.8	18.8	24.6	44.7	0.2	14.8	15.6	17.6	31.1

Source: Statistics Austria (micro census).

Chart 2

**Changes in household size and real property prices**

Source: Statistics Austria, author's calculations.

The shrinking household size manifests itself in a decline in the average size of multi-person households as well as in an increase in the number of one-person households. The share of one-person households has surged in Austria in recent years, rising from 29.7% in 1991 to 37.0% in 2017. According to the housing need forecast made by ÖROK, this share is projected to rise further, to 38.1%, until 2030. Regarding the age structure of one-person households, people aged 45 to 59 accounted for the strongest increase among all one-person households (from 14.8% in 1991 to 24.6% in 2017). In contrast, population ageing played a more limited role. The share of people aged 60 and above in the total population rose from 20.1% in 1991 to 24.6% in 2018; yet, this rise occurred primarily among multi-person households. Among one-person households, the share of people aged 60 and above declined from 54.8% in 1990 to 44.7% in 2017.

While motivated by people's personal circumstances, decisions like setting up a new home or separate households after a divorce also depend on the affordability of housing. Contrasting the change in household size with the growth of real house prices, chart 2 shows that those two factors are closely correlated. The sharpest

decline in household size was observed in the first half of the 2000s. This period was characterized by shrinking real house prices (as well as declining interest rates for housing loans), which made housing more affordable. Following a steady rise in price pressures from the mid-2000s onward, the decline in average household size has since decelerated visibly.

The number of one-person households is also heavily influenced by the prevailing divorce rates. In Austria, divorce rates were rising steadily for decades before starting to decline in the mid-2000s. Rising house prices can be expected to have had an impact on this decline.<sup>11</sup>

## 2.2 Demand for secondary residences

Another component of housing demand is the demand for secondary residences. The number of secondary residences plus the number of homes not identified as either primary or secondary totaled 796,500 according to the housing records for 2011. This corresponds to a share of 17.9% of all housing units. Unlike the earlier housing censuses, the housing records for 2011 did not distinguish between secondary residences and residences not identified as either primary or secondary. The 2001 housing census listed 40.4% of all homes not identified as primary residences as secondary residences. By approximation, a share of 40.4% corresponds to 322,100 homes based on the housing records for 2011. In the period from 2001 to 2011, the number of secondary residences or homes not identified as either primary or secondary rose by 24,900 per year. However, the housing records for 2011 and the 2001 housing census are not comparable (Statistics Austria, 2013). Thus, the difference between the 1981 housing census and the 1991 housing census provides a more reliable indication of the estimated demand for secondary residences. In the period from 1981 to 1991, the number of secondary residences or homes not identified as either primary or secondary rose by 6,700 per year. This figure, as adjusted for the changes in the number of households, was used to establish corresponding figures for the period after 1991.

## 2.3 Housing vacancy

Housing vacancy rates are an important but often unknown indicator of developments in the housing market. For the housing market to function properly, a given amount of vacant homes is needed to offset short-term increases in demand, provide temporary housing during periods of refurbishment and modernization, and facilitate housing transactions. Marked upward deviations of actual vacancy rates from this “optimum vacancy rate”<sup>12</sup> indicate a housing oversupply, either as a result of excessive construction activity or as a result of regional depopulation. High vacancy rates may also point to a high incidence of homes that are not marketable. In turn, vacancy rates that are well below the optimum vacancy rate indicate a housing undersupply.

Measuring vacancy rates is a big challenge. No current data were available for Austria as a whole at the time of writing. The 2001 housing census had yielded a count of 326,314 residences not identified as either primary or secondary, which corresponds to 8.4% of the housing stock. However, the number of residences not identified as

<sup>11</sup> *The international empirical literature provides robust evidence for the relationship between the development of house prices and divorce rates (Farnham et al., 2010; Milosch, 2014).*

<sup>12</sup> *Also known as “natural vacancy rate” or “long-run equilibrium vacancy rate.”*

either primary or secondary says very little about actual housing use. In fact, the actual vacancy rates are likely to be well below this ratio, as the results of vacancy rate surveys made in individual provinces of Austria imply.<sup>13</sup> More accurate estimates could be produced – subject to considerable efforts – with sample surveys, local property inspections or survey methods tailored to different property use categories (see Amann and Mundt, 2018).

For the purpose of this paper, vacancy stocks and their changes are explored in three parts, namely additional vacancies required to maintain the optimum vacancy rate, additional vacancies in shrinking areas, and vacancies offsetting short-term fluctuations in demand.<sup>14</sup>

### 2.3.1 Additional vacancies needed to maintain the optimum vacancy rate

In a growing market, additional homes are needed to help maintain the long-run equilibrium at which the vacancy rate equals the optimum, or natural, vacancy rate. The optimum vacancy rate is an integral part of housing demand. According to international empirical evidence, 3% to 5% of the housing stock must be vacant for the housing market to function adequately (Rink and Wolff, 2015).<sup>15</sup> Hence, this paper starts from the assumption that it takes a vacancy rate of 3% of the housing stock – corresponding to 117,000 homes in 2017 – for the housing market to keep working. Looking ahead, the optimum vacancy rate is expected to keep rising at the same rate as the number of households in the period from 2019 to 2030. This translates into an average annual growth rate of 0.7% (or 900 homes) per year.

### 2.3.2 Additional vacancies in shrinking areas

Shrinking areas are characterized by a declining number of households, which leads to housing vacancy. A growing number of households in most parts of Austria coinciding with a shrinking number of households in other regions causes overall housing demand to be underestimated, as the vacancies developing in shrinking areas cannot be used to meet housing demand in other areas.

Hence, it is necessary to adjust the household numbers accordingly for this type of vacancies (“regional mismatch”). The corresponding figures were derived as follows:

<sup>13</sup> Property vacancy studies have, however, been carried out for some of Austria's provinces in recent years. Straßl and Rieder (2015) provided an analysis for the city of Salzburg. Using electricity meter readings, they came up with a vacancy stock of 4,800 homes (= 5.5% of the housing stock). A residential property vacancy survey conducted by the Vienna city administration in 2015 yielded 25,000 homes that were vacant and marketable (i.e. available for use), subject to a vacancy duration of up to 2½ years. Longer vacancies, resulting among other things from refurbishments, were reported for about 10,000 marketable homes. The total vacancy stock was found to be equivalent to 3½% of the housing stock (approximately 1 million homes) in Vienna. This survey is the latest survey conducted in more than two decades, following a vacancy survey made on the basis of the 1991 housing census. A survey conducted by IIBW (2018) for the province of Vorarlberg on housing vacancy and the inclination of home owners to put homes on the market yielded a vacancy rate of 4% (some 8,500 homes). The number of vacant homes that could be made available for use within a short period of time was estimated at 2,000.

<sup>14</sup> A common way of defining the vacancy stock further is to distinguish between the marketable vacancy stock (which may be made available for occupancy in the short to medium term) and the nonmarketable vacancy stock. For alternative breakdowns, see Straßl and Rieder (2015) as well as Amann and Mundt (2018). A further category in the ongoing debate on housing vacancy are homes purchased for investment purposes but hoarded temporarily in anticipation of a further rise in asset prices. At the time of writing, no data were available for this category.

<sup>15</sup> Categorizing vacancy rates for Germany's housing market, Rink and Wolff (2015) moreover found vacancy rates to become problematic once they reach or exceed 7%. Vacancy rates within this range already indicate a buyers' or renters' market. Vacancy rates within the 2% to 3% range indicate a landlords' market and a tightening of housing supply, while vacancy rates of 2% or less indicate a housing shortage.

The total change in household numbers across all political districts was adjusted for the development in shrinking districts by setting the change in those districts to zero. This approach is based on the implicit assumption that any vacant homes accumulating in shrinking districts will not be sought after by households from other districts. The same calculations were made at the municipal level. In sum, the regional mismatch-related vacancy count for the period from 2003 to 2018 was 500 homes per year at the district level and 3,500 homes per year at the municipal level. The estimate for the municipal level certainly constitutes an upper bound, as it is likely that some of the vacant homes may be filled by inhabitants from other municipalities. In contrast, the estimate for the district level constitutes a lower bound, as there is no perfect mobility within a district. Therefore, the regional mismatch was assumed to be equivalent to the mean amount of the district estimates and the municipality estimates, yielding 2,000 homes in the period from 2003 to 20018. According to the housing demand forecast published by ÖROK (2017) for the period from 2014 to 2030, this regional mismatch is set to increase until 2030, as household numbers are expected to shrink in a number of Styrian and Carinthian districts.<sup>16</sup> From 2019 onward, the mean amount of the municipal estimate and the district estimate was projected to keep growing in line with the change of the mismatch as projected in the ÖROK housing demand forecast. This exercise yielded an average increase in housing vacancy of 3,200 homes per year in the period from 2019 to 2030 as a result of the regional mismatch of housing vacancy and demand. This corresponds to close to 1% of the housing stock.

### 2.3.3 Change in vacancies needed to meet short-term fluctuations in demand

Changes in housing demand will rarely match changes in housing supply. If additional demand exceeds additional supply, the vacancy stock will shrink; if additional supply exceeds additional demand, the vacancy stock will increase. The corresponding change in vacancies is neither part of demand nor part of supply but results from the difference between the growth of supply and the growth of demand (see section 4).

### 2.4 Net loss of housing stock

The housing stock decreases whenever residential space is lost as housing units are demolished, reclassified, or merged with other homes. In March 2018, Statistics Austria published data on the net loss of housing, broken down by provinces, with the time series starting in November 2011. These data have filled a long-standing data gap. According to these data, the net loss of housing came to 9,700 homes on average in the period from 2012 to 2017, which corresponds to 0.26% of the housing stock in Austria. This ratio is in line with the figures typically used in housing need projections for Germany (ranging from 0.1% to 0.3%; Henger et al., 2015). Accordingly, we used the ratio of 0.26% also for the period up to 2012.

### 2.6 Total housing demand

Total housing demand is the sum total of demand for primary and secondary residences, changes in the vacancy stock required to maintain the optimum vacancy rate,

<sup>16</sup> However, the mismatch as suggested by the ÖROK housing demand forecast lies well below the mismatch according to historical evidence, as ÖROK's forecast for the shrinking areas is based on a sharp decline in household size, which has an offsetting effect on total housing demand.

Table 3

## Housing demand in Austria

Total	Primary residences				Secondary residences	Vacancies in shrinking areas	Vacancies needed to maintain the optimum vacancy rate	Net loss of housing
	Total	Change in household size	Net migration	Residual				

Change in number of housing units (thousands per year)

### 1981–1990

Housing units in thousands per year

44.1	28.3	23.4	5.4	-0.4	6.1	4.7	1.0	6.5
100.0	60.7	50.1	11.5	-0.9	13.1	10.1	2.2	13.9

% of total demand

### 1991–2000

Housing units in thousands per year

48.5	28.3	23.4	5.4	-0.4	6.1	4.7	1.0	6.5
100.0	60.7	50.1	11.5	-0.9	13.1	10.1	2.2	13.9

% of total demand

### 2001–2010

Housing units in thousands per year

47.9	28.3	23.4	5.4	-0.4	6.1	4.7	1.0	6.5
100.0	60.7	50.1	11.5	-0.9	13.1	10.1	2.2	13.9

% of total demand

### 2011–2018

Housing units in thousands per year

57.9	28.3	23.4	5.4	-0.4	6.1	4.7	1.0	6.5
100.0	60.7	50.1	11.5	-0.9	13.1	10.1	2.2	13.9

% of total demand

### 2019–2030

Housing units in thousands per year

42.4	28.3	23.4	5.4	-0.4	6.1	4.7	1.0	6.5
100.0	60.7	50.1	11.5	-0.9	13.1	10.1	2.2	13.9

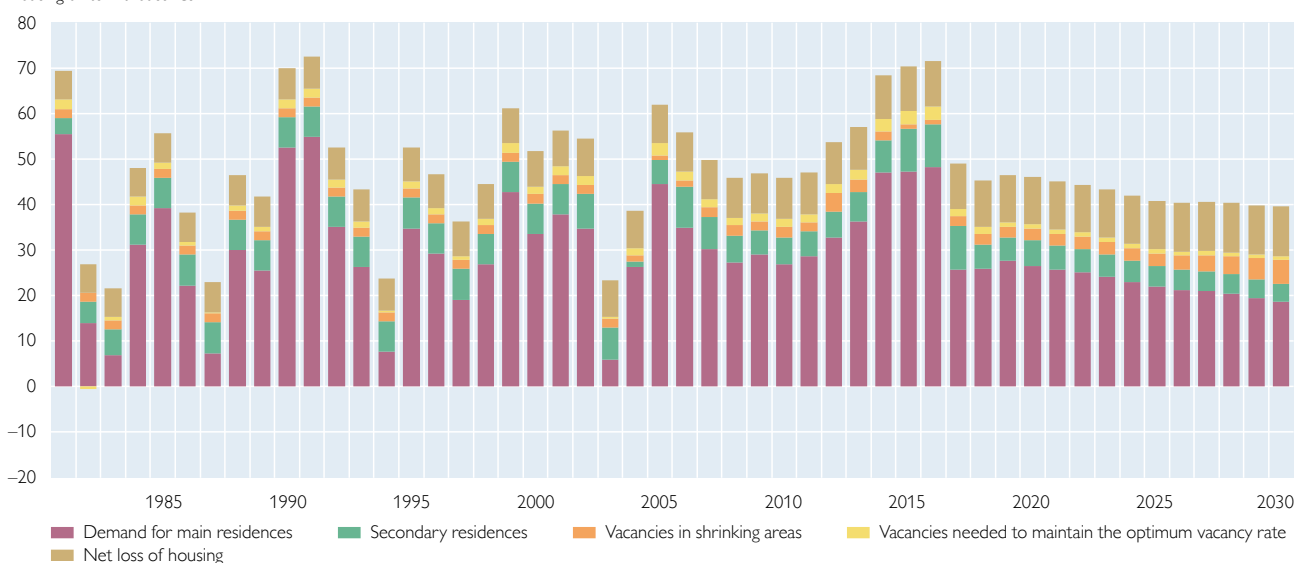
% of total demand

Source: Statistics Austria, OeNB calculations.

Chart 3

## Housing demand in Austria

Housing units in thousands



Source: Statistics Austria, author's calculations.

additional vacancies accumulating in shrinking areas, as well as the net loss of housing stock. In the 1990s, housing demand increased by 44,400 homes per year on average (see table 3). Close to two-thirds thereof (64% or 28,300 homes) are attributable to the demand for primary residences. Demand for secondary residences amounted to 6,100. The (estimated) increase of the vacancy stock (regional mismatch and vacant homes required to maintain the optimum vacancy rate) came to 2,800 homes. The estimated annual net loss of housing amounted to 7,100 homes. In the 1990s and 2000s, the growth of total housing demand thus increased to around 48,000 homes per year.

In the period from 2011 to 2018, the growth of total housing demand jumped to 57,900 homes per year as a result of net migration. Demand for primary residences accounted for 63% of this amount. Looking ahead, total housing demand is projected to decrease to 42,400 homes per year on average in the period from 2019 to 2030. By 2030, this figure is expected to have dropped to 39,700.

### 3 Housing supply

The annual increase in housing supply is based on the number of newly completed homes. However, housing completion data are fraught with a number of problems, which may cause the actual number of newly developed homes to be underestimated. This section explores the underlying problems and illustrates the adjustments made to deal with those problems.

#### 3.1 Adjustments for the completion of existing housing

Housing completion data also contain housing units completed as a result of splitting, merging, increasing, decreasing or otherwise reconstructing existing residential space; i.e. housing units that do not qualify as newly developed homes. The corresponding numbers need to be deducted from the housing completion statistics; yet, these numbers are only available for the years from 2010 to 2016. In this period, as much as 58% of all housing completions in existing buildings do not qualify as newly developed homes, because they resulted from some sort of redevelopment. For the period before 2010, the housing completion statistics were adjusted accordingly with this percentage.

#### 3.2 Estimates of missing data on housing additions or alterations for Vienna

Since 2005, housing completion data reported by the city of Vienna have only referred to newly completed homes in newly constructed buildings, but no new homes created through additions to existing housing or alterations thereof. Having analyzed old housing data for Vienna for the period from 1980 to 2002, which were based on different definitions, we find the share of housing additions or alterations to have been on the rise. While this share was as low as 3% in 1984, it had risen to 17% by 2002. Projections based on multiplying the available housing completion data with this percentage yields estimates of the amount of housing additions or alterations made in Vienna. However, these figures also include housing units that were created through splitting or merging homes, through increasing or decreasing existing residential space, or through other alterations. Since data on housing additions or alterations were not available for Vienna, the available housing completion figures were adjusted for the share of not newly developed homes for Austria (58%). This exercise yielded 500 additional housing completions per year on average for Vienna.

### 3.3 Smoothing of housing completion peak in Vienna in 2008

The exceptionally high number of housing completions in 2008 reported by the city of Vienna also reflects more than 5,100 homes for which no completion dates were on record.<sup>17</sup> For the purpose of this paper, these 5,100 homes were reallocated to the years from 2005 to 2008 on a pro rata basis.

### 3.4 Adjustments for missing data on Vienna

When we compare the number of housing completions recorded in line with former definitions for the 1980–2002 period with the number of building permits, we find that, on average, housing completions correlate with 97% of the building permits issued two years earlier; in other words, only 3% of the housing projects approved in a given year were not completed before the end of the year. The same relationship is evident from the statistics compiled since 2005 for Austria's provinces excluding Vienna. For Vienna, however, the time series starting in 2005 exhibit a sizeable gap. On average, the number of housing completions falls 37% short of the number of building permits issued two years earlier. This is why the available data on housing completions in Vienna were increased by 34% starting with the year 2005, to bring the data in line with the relationship between housing completions and building permits (97%) observed for the rest of Austria. On average, this brings up the number of annual housing completions by 1,600 from 2005 onward.

### 3.5 Missing data for 2003 and 2004

No data on housing completion have been published by Statistics Austria for 2003 and 2004, as delays in the legislative process led to temporary coverage gaps. For the purpose of this analysis, the missing data for 2003 and 2004 were replaced with the mean values for the period from 2002 to 2005.

### 3.6 Overall adjustments

In sum, the adjustments caused the available housing completion data to be reduced by 2,600 homes per year on average. Following weak housing completion growth in the 1981–1990 period – with just 39,600 homes completed per year – the 1990s saw a rapid acceleration of construction activity. From 1991 to 2000, the number of homes completed (as adjusted) totaled 47,800 per year on average. Thereafter, construction activity bottomed out in 2004 with 36,500 new homes being completed. In 2017, 57,400 new homes were completed.

### 3.7 Projections for the period from 2018 to 2020

At the time of writing, housing completion data were available until 2017. Given the significant correlation between housing completion growth in a given year and building permit growth two years earlier, this correlation can be used to project future housing completion growth. The projections for 2018, 2019 and 2020 are based on an estimation equation that regresses building completion growth in year  $t$  on building permit growth in year  $t-2$ .<sup>18</sup> At the time of writing, building permit data were

<sup>17</sup> For further details see [http://www.statistik.at/web\\_de/statistiken/menschen\\_und\\_gesellschaft/wohnen/wohnungs\\_und\\_gebaeudeerrichtung/fertigstellungen/045273.html](http://www.statistik.at/web_de/statistiken/menschen_und_gesellschaft/wohnen/wohnungs_und_gebaeudeerrichtung/fertigstellungen/045273.html) (available in German only).

<sup>18</sup>  $d(\log(\text{completions})) = 0.0101 + 0.5635*d(\log(\text{housing completions}(-2))) - 0.3032*dummy2009$ .  $R^2=0.537$ ,  $DW=1.978$ .



available up to the fourth quarter of 2018. These data show that the number of building permits declined by 14% in 2018 as a whole. Accordingly, we project 63,900 housing completions for 2018, 67,000 for 2019, and 63,000 for 2020.

#### 4 Changes in excess demand

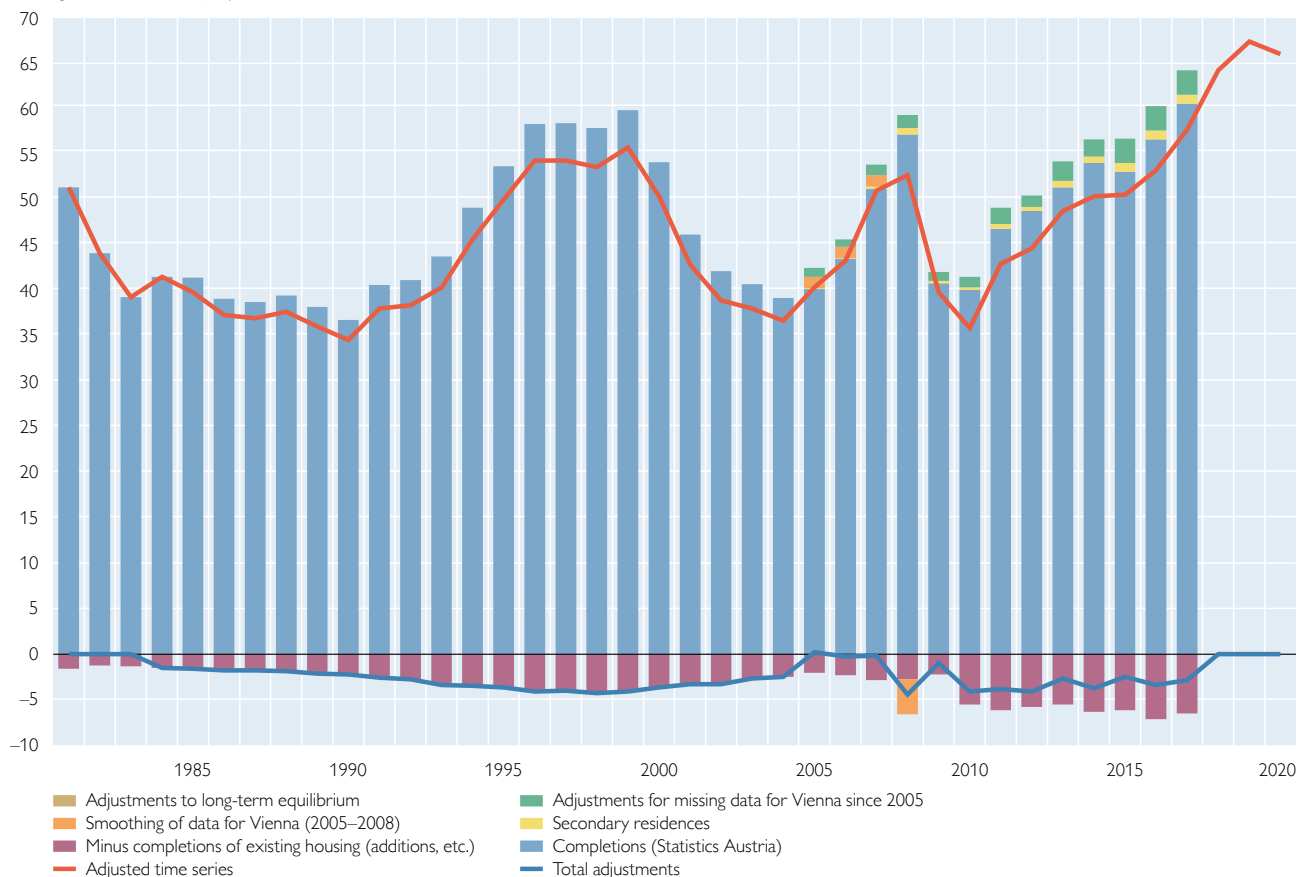
This section explores the demand-supply balance, i.e. the level of excess annual demand (or supply) that arises as additional demand exceeds the new supply (or vice versa, see the dotted line in chart 5). In the period from 1980 to 2020, annual demand averaged 49,000 homes, thus exceeding annual supply (45,800 homes) by 3,200 homes each year.

It is a known phenomenon that housing completions tend to underestimate actual construction activity.<sup>19</sup> In the absence of other useful benchmarks, we use an *equilibrium approach* to solve this data problem. Under the (plausible) assumption that

Chart 4

#### Adjustments to housing completion data

Housing units in thousands per year



Source: Statistics Austria, author's calculations.

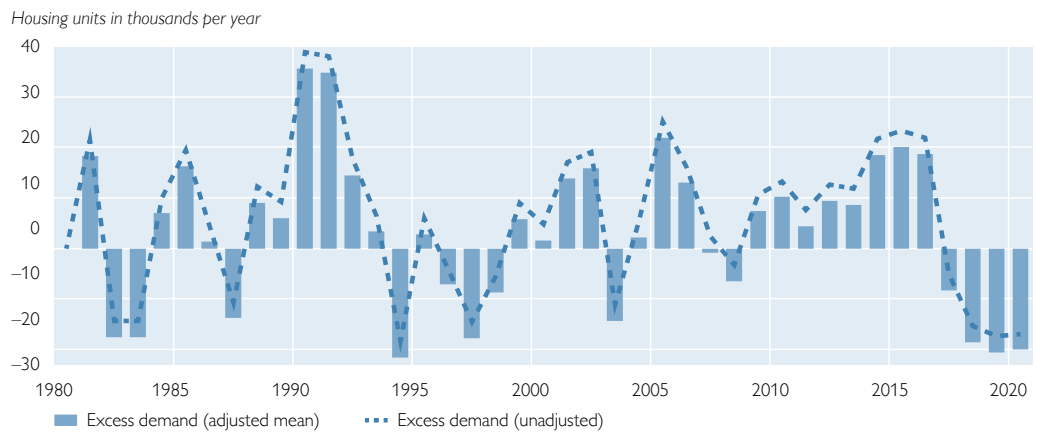
<sup>19</sup> According to the 2005 housing demand forecast published by ÖROK (2005), the number of housing completions fell visibly short of the number of housing completions calculated with the building period method in the 1990s. Based on plausible adjustments for the net loss of housing, the building period method interprets all changes in the stock of housing constructed in the previous decade as new homes. As this survey method has since been replaced by a housing register, it cannot be used for later periods. Schremmer et al. (2015) discuss the data problems taking the province of Vorarlberg as an example.

the property market will be in equilibrium in the long term, any changes occurring to supply in the long term (from 1980 to 2020 in our case) would be expected to equal the growth in demand. Therefore, we adjust excess annual demand for its mean (3,200 homes). In line with this estimation, demand growth exceeded supply growth in the years before 2016. In the period from 2009 to 2016, excess annual demand totaled 9,000 homes. By 2017, the number of housing completions exceeded demand by 11,400 homes according to our estimation, and in 2018 by 21,700 homes. In 2019 and 2020, the number of housing completions is expected to exceed demand by 23,700 and 23,200 homes, respectively.

The calculations made so far relate to the *additional demand or supply* emerging in a given year, without providing any indication of the absolute value of excess demand

Chart 5

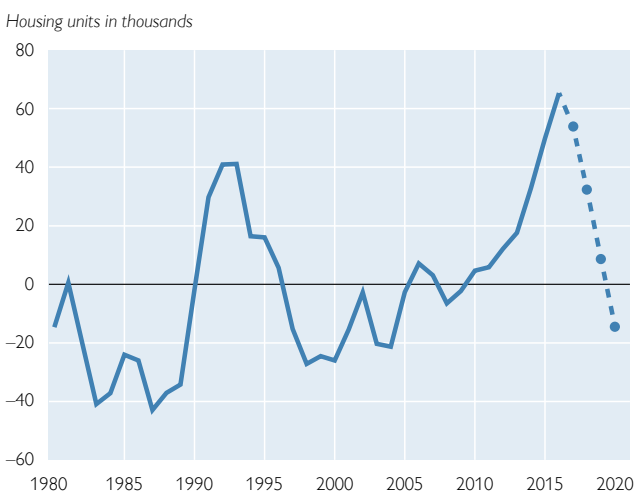
### Backlog housing demand in Austria



Source: OeNB, Vienna University of Technology, Statistics Austria, author's calculations.

Chart 6

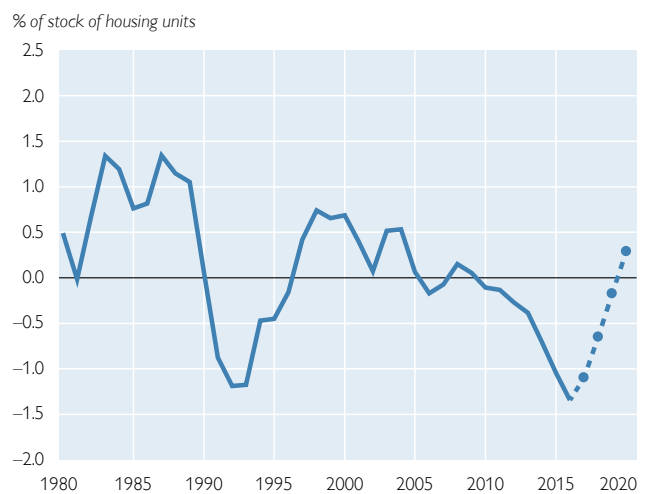
### Backlog housing demand in Austria



Source: Statistics Austria, author's calculations.

Note: Dotted line (2017–2020) includes projected completions.

### Vacancy rate deviation from long-term equilibrium



or supply. In a next step, we calculate  $t$  by cumulating the annual excess demand figures (left panel of chart 6). A zero result would indicate the absence of backlog demand or supply, and the vacancy rate would be in its long-term equilibrium. The right panel of chart 6 shows the resulting deviation of the vacancy rate from its long-term equilibrium value, which is calculated by dividing the inverted negative backlog demand by the housing stock.

Following oversupply of housing, the market tipped into a state of increasing backlog demand in the first half of the 1990s, with demand exceeding supply by as much as 41,000 homes in 1993. Rising backlog demand was fueled by the strong net migration that emerged after the fall of the Iron Curtain and the breakup of Yugoslavia in the 1989–1993 period. Thereafter, backlog demand reversed again in the second half of the 1990s, turning into a backlog supply of 27,000 homes in 1998. From the early 2000s onward, the backlog supply was depleted gradually due to strong demand but little construction activity, resulting in demand slightly exceeding supply. Construction activity rebounded from 2006 to 2008 but was cushioned by the economic and financial crisis thereafter. From 2009 onward, the level of backlog demand rose steadily, peaking at about 65,000 homes in 2016. Since then, the amount of backlog demand has been shrinking again, given stronger construction activity and lower demand. The remaining backlog demand is expected to have been removed by 2020.

The housing vacancy rate was 0.6 percentage points below the optimum vacancy rate (ranging from 3% to 5%) in 2018. These figures are a good match for results from housing vacancy studies made for Vienna (2015) and Vorarlberg (2018), according to which the vacancy rates currently come to 3½% and 4%, respectively. During the review period, the vacancy rate fluctuated within a range of 2½ percentage points. This implies that the housing market has remained relatively stable in Austria, exhibiting neither vacancy crises nor a pronounced housing shortage.<sup>20</sup>

## 5 Discussion of results

The purpose of this paper was to estimate the level of backlog demand in the Austrian housing market.<sup>21</sup> Due to missing data, assumptions had to be made for a number of factors, including the number of secondary residences, the net loss of housing and specific housing completions, thus leading to a certain degree of imprecision in the results. The biggest unknown were missing data for the city of Vienna. The missing data were replaced with estimates derived on the basis of old housing data, which used different definitions. Given the pace of construction activity in Vienna, the risk remains that activity was underestimated nonetheless, especially with regard to housing additions and alterations. This would imply that backlog demand

<sup>20</sup> According to a comparison of similar calculations for all EU countries (except Malta and the U.K.) based on the number of households and housing completions, the national vacancy rates fluctuated within a range of 5 percentage points on average in the period from 2000 to 2017. Ireland was the country with the highest volatility (12.3 percentage points) and Poland the country with the lowest volatility (1.4 percentage points). In Austria, the vacancy rate varied by 2.2 percentage points during this period, which put Austria on rank 11 (in ascending order) among the 26 EU countries under review.

<sup>21</sup> Compared with an earlier version of this paper (Schneider, 2019a), this article has taken on board the household forecast published by Statistics Austria in 2018 as well as incoming information on the number of primary residences and building permits. Furthermore, adjustments have been made for a break in the time series for the number of households in the early 1980s.

in Austria may be eliminated even before 2020. Furthermore, like all forecasts, the household forecast published by Statistics Austria is fraught with a high degree of uncertainty. The assumptions regarding net migration have typically been subject to major revisions. Likewise, the absolute figures for backlog demand should also be interpreted with caution, as these figures depend not only on the assumption that the housing market will indeed be in equilibrium in the long term but also on the length of the review period. Other factors to be considered when interpreting the results include the fact that using the key component of demand – i.e. changes in the number of households – as an indicator for housing need is fraught with at least two problems. First, the number of households is dependent on the supply of housing, as households have separate homes by definition. In other words, the number of households can only go up as the housing supply increases or as the vacancy rate goes down. Second, the pace of household creation is also driven by the availability of affordable housing. In other words, household numbers are also dependent on property or rent prices. Hence, the estimated figures tend to understate demand in periods of rising property prices and tightening supply, as some household preferences will remain unmet in times of rising prices and housing undersupply. However, estimates on unmet demand come with a high normative share and are beyond the scope of this paper. At any rate, the data show that the years with the highest levels of excess demand (1992 and 2016) coincided with periods in which fewer households were established. At the same time, construction activity increased, which caused backlog demand to be removed within a period of about four years, or which may cause backlog demand to have been removed by 2020 as forecast.

Given the strong segmentation of property markets, the results for Austria as a whole do not allow conclusions to be drawn for individual market segments or regions. The housing market will always be tighter in metropolitan areas than in rural areas, some of which are characterized by shrinking population figures. Last but not least, the housing market is also tighter in the subsidized segment than in the unsubsidized segment, in which the supply has been growing at a faster pace.

## References

- Amann, W. and A. Mundt. 2018.** Investiver Wohnungsleerstand. Studie des IIBW im Auftrag des Landes Vorarlberg.
- Bank Austria. 2017.** Österreichischer Immobilienmarkt. "Nach wie vor kein Ende des Immobilienzyklus in Sicht?" Real Estate Country Facts 10/2017.
- Bramley, G., H. Pawson, M. White and D. Watkins. 2010.** Estimating housing need. Research Report. Communities and Local Government.
- Bundesinstitut für Bau-, Stadt- und Raumforschung (BBSR). 2014.** Aktuelle und zukünftige Entwicklung von Wohnungsleerständen in den Teilräumen Deutschlands. Datengrundlagen, Erfassungsmethoden und Abschätzungen.
- Farnham, M., L. Schmidt and P. Sevak. 2010.** House prices and marital stability. Mimeo.
- Henger, R., M. Schier and M. Voigtländer. 2015.** Der künftige Bedarf an Wohnungen. Eine Analyse für Deutschland und alle 402 Kreise. IW Policy Paper 24/2015.
- Milosch, J. 2014.** House price shocks and individual divorce risk in the US. Mimeo.
- Schneider, M. 2019.** Nachfrage und Angebot am österreichischen Wohnimmobilienmarkt. Österreichischer Verband gemeinnütziger Bauvereinigungen (ed.): Wohnungsgemeinnützigkeit in Recht – Wirtschaft – Gesellschaft. Essays in honor of Karl Wurm. Vienna: LexisNexis. 215–236.

- Schremmer, C., U. Mollay and P. Moser. 2015.** Wohnungsbedarfsprognose für Vorarlberg und die Region Rheintal bis zum Jahr 2030. Study commissioned by the Austrian Institute for Regional Studies and Spatial Planning (ÖIR) and the Austrian Institute for Urban and Regional Studies (SRZ).
- ÖROK – Austrian Conference on Spatial Planning. 2005.** ÖROK-Prognose 2001-2031. Teil 2: Haushalte und Wohnungsbedarf nach Regionen und Bezirken Österreichs. ÖROK-Schriftenreihe 166/II.
- ÖROK – Austrian Conference on Spatial Planning. ÖROK-Regionalprognosen 2014-2030,** Teil 3: Haushalte. ÖROK-Schriftenreihe 196/II.
- Rink, D. and M. Wolff. 2015.** Wohnungsleerstand in Deutschland. Zur Konzeptualisierung der Leerstandsquote als Schlüsselindikator der Wohnungsmarktbeobachtung anhand der GWZ 2011. Raumforschung und Raumordnung, September.
- Statistics Austria. 2004.** Gebäude- und Wohnungszählung 2001. Hauptergebnisse Österreich.
- Statistics Austria. 2013.** Census 2011. Gebäude- und Wohnungszählung. Ergebnisse zu Gebäuden und Wohnungen aus der Registerzählung.
- Straßl, I. and W. Riedler. 2015.** Wohnungsleerstand in der Stadt Salzburg. Zahlen – Gründe – Mobilisierungsmaßnahmen. Studie des Salzburger Instituts für Raumordnung & Wohnen. June.
- Zabel, J. E. 2003.** The demand for housing services. *Journal of Housing Economics* 13. 16–35.

## 6 Appendix

Table A1

## Housing supply and demand in Austria

Demand									
Total	Demand for main residences (= change in number of households)				Secondary residences	Vacancies in shrinking areas	Vacancies needed to maintain the optimum vacancy rate	Net loss of housing	
	Total	Change in household size	Net migration	Residual					
<i>Change in number of housing units (thousands per year)</i>									
1981	69.4	55.4	48.4	10.9	-3.8	3.7	2.0	2.0	6.3
1982	26.3	14.0	12.0	-8.7	10.7	4.7	2.0	-0.6	6.2
1983	21.6	7.0	11.5	-0.6	-3.9	5.7	2.0	0.6	6.3
1984	48.2	31.2	31.4	1.1	-1.2	6.7	2.0	1.8	6.4
1985	55.8	39.2	37.8	2.1	-0.8	6.7	2.0	1.4	6.5
1986	38.3	22.3	20.5	2.4	-0.5	6.7	2.0	0.8	6.6
1987	22.9	7.4	5.6	0.7	1.1	6.7	2.0	0.3	6.6
1988	46.4	30.0	25.9	5.1	-1.0	6.7	2.0	1.1	6.6
1989	41.8	25.5	12.2	17.6	-4.3	6.7	2.0	0.9	6.7
1990	70.0	52.6	29.8	23.0	-0.2	6.7	2.0	1.9	6.8
1991	72.6	54.9	24.6	30.4	-0.0	6.7	2.0	2.0	7.0
1992	52.5	35.1	1.1	28.3	5.7	6.7	2.0	1.7	7.1
1993	43.4	26.3	0.6	13.3	12.4	6.7	2.0	1.3	7.2
1994	23.9	7.6	-4.4	1.2	10.9	6.7	2.0	0.4	7.2
1995	52.5	34.8	30.0	0.8	4.0	6.7	2.0	1.7	7.3
1996	46.7	29.3	24.9	1.6	2.7	6.7	2.0	1.4	7.4
1997	36.2	19.1	15.5	0.6	3.0	6.7	2.0	0.9	7.5
1998	44.5	27.0	23.4	3.4	0.1	6.7	2.0	1.3	7.6
1999	61.2	42.8	36.4	8.2	-1.8	6.7	2.0	2.1	7.7
2000	51.7	33.6	25.7	7.1	0.8	6.7	2.0	1.6	7.8
2001	56.3	37.9	25.1	7.2	5.6	6.7	2.0	1.8	7.9
2002	54.5	34.8	18.1	14.0	2.7	7.6	2.0	2.1	8.1
2003	23.4	6.0	-9.1	16.7	-1.6	6.9	2.0	0.4	8.1
2004	38.7	26.3	4.8	21.3	0.1	1.2	1.4	1.6	8.2
2005	62.0	44.5	21.0	18.7	4.8	5.2	1.2	2.7	8.4
2006	55.9	35.0	16.9	10.2	7.8	8.9	1.4	2.1	8.5
2007	49.9	30.3	18.7	9.8	1.8	7.0	2.2	1.8	8.7
2008	46.0	27.3	16.0	9.5	1.8	6.0	2.3	1.6	8.8
2009	47.0	29.0	20.4	6.9	1.7	5.4	1.9	1.7	8.9
2010	45.8	27.0	18.5	8.4	0.1	5.8	2.4	1.6	9.0
2011	47.1	28.8	16.8	13.5	-1.6	5.4	2.1	1.7	9.1
2012	53.8	32.8	16.3	17.4	-0.9	5.7	4.1	2.0	9.3
2013	57.1	36.3	13.9	21.0	1.3	6.5	2.7	2.2	9.4
2014	68.5	47.0	17.6	27.7	1.7	7.2	1.8	2.8	9.6
2015	70.4	47.3	9.4	48.5	-10.7	9.4	1.1	2.8	9.8
2016	71.5	48.3	-0.5	28.8	20.0	9.4	1.0	2.9	10.0
2017	49.1	25.8	1.3	19.0	5.4	9.6	2.1	1.5	10.1
2018	45.4	26.0	4.3	18.6	3.1	5.1	2.5	1.6	10.2
2019	46.4	27.6	8.4	18.2	1.0	5.2	2.4	1.0	10.3
2020	46.1	26.6	7.6	17.2	1.8	5.5	2.5	1.1	10.4
2021	45.0	25.7	7.1	17.0	1.7	5.3	2.6	1.0	10.4
2022	44.4	25.1	6.7	16.3	2.1	5.1	2.7	1.0	10.5
2023	43.4	24.1	6.2	16.1	1.9	5.0	2.8	1.0	10.6
2024	42.0	23.0	5.4	15.4	2.1	4.8	2.6	0.9	10.6
2025	40.9	22.0	5.0	15.2	1.8	4.6	2.8	0.9	10.7
2026	40.4	21.3	4.9	14.6	1.8	4.4	3.1	0.8	10.7
2027	40.6	21.1	5.3	14.5	1.4	4.2	3.6	0.8	10.8
2028	40.3	20.5	5.4	13.9	1.3	4.2	4.0	0.8	10.9
2029	39.9	19.4	4.9	13.3	1.2	4.1	4.7	0.8	10.9
2030	39.7	18.7	4.9	12.9	0.9	3.9	5.4	0.7	11.0

Source: Statistics Austria, author's calculations.

Table A2

**Housing supply and demand in Austria (continued)**

	Supply (housing completions)						Excess demand (demand – completions)			
	Completions (Statistics Austria)	Minus completions of existing housing (additions, etc.)	Estimates of missing data on housing additions or alterations for Vienna since 2005	Smoothing of data for Vienna (2005–2008)	Adjustments for missing data for Vienna since 2005	Total adjustments	Adjusted time series incl. 2017–2020 projections	Per year (minus 1981–2020 mean)	Backlog demand (= cumulated demand minus 1981–2020 mean)	Vacancy rate deviation from long-term equilibrium
	Change in number of housing units (thousands per year)									percentage points
1981	51.0	-1.6	0.0	0.0	0.0	-1.6	51.0	15.2	0.5	-0.0
1982	43.9	-1.3	0.0	0.0	0.0	-1.3	43.9	-20.7	-20.2	0.7
1983	39.1	-1.3	0.0	0.0	0.0	-1.3	39.0	-20.7	-40.9	1.3
1984	41.3	-1.5	0.0	0.0	0.0	-1.5	41.3	3.7	-37.2	1.2
1985	41.2	-1.6	0.0	0.0	0.0	-1.6	39.5	13.1	-24.1	0.8
1986	38.8	-1.8	0.0	0.0	0.0	-1.8	37.1	-1.9	-26.0	0.8
1987	38.5	-1.8	0.0	0.0	0.0	-1.8	36.7	-17.0	-43.0	1.3
1988	39.2	-1.8	0.0	0.0	0.0	-1.8	37.4	5.9	-37.1	1.1
1989	38.0	-2.1	0.0	0.0	0.0	-2.1	35.8	2.8	-34.3	1.1
1990	36.6	-2.2	0.0	0.0	0.0	-2.2	34.4	32.4	-1.8	0.1
1991	40.4	-2.5	0.0	0.0	0.0	-2.5	37.8	31.6	29.7	-0.9
1992	40.9	-2.8	0.0	0.0	0.0	-2.8	38.1	11.2	41.0	-1.2
1993	43.5	-3.3	0.0	0.0	0.0	-3.3	40.1	0.1	41.1	-1.2
1994	48.9	-3.5	0.0	0.0	0.0	-3.5	45.4	-24.7	16.4	-0.5
1995	53.4	-3.7	0.0	0.0	0.0	-3.7	49.7	-0.4	16.0	-0.5
1996	58.0	-4.0	0.0	0.0	0.0	-4.0	53.9	-10.4	5.7	-0.2
1997	58.0	-4.0	0.0	0.0	0.0	-4.0	54.0	-20.9	-15.3	0.4
1998	57.5	-4.2	0.0	0.0	0.0	-4.2	53.2	-11.9	-27.2	0.7
1999	59.5	-4.0	0.0	0.0	0.0	-4.0	55.4	2.7	-24.5	0.7
2000	53.8	-3.7	0.0	0.0	0.0	-3.7	50.1	-1.5	-26.0	0.7
2001	45.9	-3.3	0.0	0.0	0.0	-3.3	42.6	10.6	-15.4	0.4
2002	41.9	-3.2	0.0	0.0	0.0	-3.2	38.7	12.6	-2.8	0.1
2003	40.4	-2.6	0.0	0.0	0.0	-2.6	37.8	-17.6	-20.4	0.5
2004	39.0	-2.5	0.0	0.0	0.0	-2.5	36.5	-1.0	-21.3	0.5
2005	39.9	-2.1	0.1	1.3	0.9	0.2	40.1	18.7	-2.7	0.1
2006	43.2	-2.3	0.1	1.3	0.8	-0.2	43.0	9.7	7.1	-0.2
2007	50.9	-2.8	0.2	1.3	1.1	-0.2	50.7	-4.0	3.1	-0.1
2008	56.8	-2.7	0.7	-3.8	1.4	-4.4	52.4	-9.6	-6.5	0.2
2009	40.5	-2.3	0.3	0.0	1.0	-1.0	39.5	4.2	-2.3	0.1
2010	39.8	-5.5	0.3	0.0	1.1	-4.1	35.7	7.0	4.7	-0.1
2011	46.5	-6.1	0.5	0.0	1.7	-3.8	42.7	1.2	5.9	-0.1
2012	48.5	-5.8	0.4	0.0	1.3	-4.1	44.4	6.2	12.1	-0.3
2013	51.0	-5.5	0.7	0.0	2.2	-2.6	48.4	5.5	17.6	-0.4
2014	53.7	-6.3	0.6	0.0	1.9	-3.7	50.0	15.3	32.9	-0.7
2015	52.7	-6.1	0.9	0.0	2.7	-2.5	50.3	17.0	49.9	-1.0
2016	56.3	-7.1	1.0	0.0	2.7	-3.4	52.9	15.5	65.3	-1.3
2017	60.2	-6.5	1.0	0.0	2.7	-2.8	57.4	-11.4	53.9	-1.1
2018							63.9	-21.7	32.3	-0.6
2019							67.0	-23.7	8.6	-0.2
2020							66.1	-23.2	-14.6	0.3
2021										0.0
2022										0.0
2023										0.0
2024										0.0
2025										0.0
2026										0.0
2027										0.0
2028										0.0
2029										0.0
2030										0.0

Source: Statistics Austria, author's calculations.

# European Economic and Monetary Union: The first and the next 20 years

Key findings from the OeNB's 46<sup>th</sup> Economics Conference  
in 2019, organized in cooperation with SUERF

Morten Balling, Ernest Gnan, Philipp Warum<sup>1</sup>

*In the morning of May 2, 2019, more than 400 participants gathered at the Vienna Marriott Hotel for the OeNB's 46<sup>th</sup> Economics Conference. This was the second time the conference has been organized in cooperation with SUERF – The European Money and Finance Forum. The conference topic was chosen to mark the 20<sup>th</sup> anniversary of European monetary union and the euro and thereby offered the opportunity to review the achievements and challenges the euro has brought so far. It also examined the history of the Eurosystem's monetary policy over the past 20 years, and it discussed the way forward. Several specialized sessions focused on the interaction of various policy areas, notably the interplay between monetary and fiscal stability, monetary and financial stability and the fiscal-financial stability nexus. Three further sessions zoomed in on the international role of the euro, on digital currencies including central bank digital currencies, and on ways how to complete European Economic and Monetary Union (EMU).*

## The euro is the most tangible result of European unification

OeNB Governor *Ewald Nowotny* opened the conference by arguing that the euro is the most tangible result of the European unification process. Day-in day-out, it is used by as many as 340 million people living in 19 European countries. The euro has established itself as the second most important currency in the world and serves as a stable monetary anchor for neighboring countries in Central, Eastern and South-Eastern Europe (CESEE). Its high approval rates reflect the Eurosystem's success in fulfilling its mandate: maintaining stable prices and providing an environment for economic growth and high employment. When the project of European integration was launched in the 1950s, exchange rates were still governed by the Bretton Woods System, which established fixed exchange rates vis-à-vis the U.S. dollar. In the late 1960s and early 1970s, the Bretton Woods System entered a state of crisis. Many countries decided to introduce floating exchange rates. The Werner Plan of 1970 and attempts, from 1972 onward, to have European currencies fluctuate against the U.S. dollar together in the so-called “snake in the tunnel” reflected Europe's desire to be sovereign in monetary affairs. The “snake in the tunnel” regime was replaced by the European Monetary System (EMS) in 1979. After the liberalization of capital flows and a series of exchange rate realignments, the EMS crisis of 1992 strengthened the cause for monetary union, which EU Heads of State or Government had just agreed upon at the Maastricht Summit. Governor Nowotny said that in some respects, the euro constitutes a technical solution to the repeated exchange rate crises in Europe. It is also a political solution in that it provides a framework under which diverging political interests can be brought together, discussed and resolved. The key difference to earlier decades,

<sup>1</sup> Aarhus University and SUERF, [mb@econ.au.dk](mailto:mb@econ.au.dk); Oesterreichische Nationalbank, Economic Analysis Division, [ernest.gnan@oenb.at](mailto:ernest.gnan@oenb.at) and Economic Studies Division, [philipp.warum@oenb.at](mailto:philipp.warum@oenb.at). Opinions expressed by the authors of this report do not necessarily reflect the official viewpoint of the OeNB or the Eurosystem.



and the crucial advantage we have today, is that now we have the European System of Central Banks (ESCB) and other institutions and procedures that help the European Union resolve conflicts while eliminating the economic and political costs of earlier exchange rate crises. EU economic governance has been reformed and strengthened, national fiscal policies are now subject to stricter European rules. The European Commission's role in monitoring Member States' budget preparation (European Semester) and in imposing sanctions has been strengthened considerably. A broader set of macroeconomic indicators is now regularly evaluated at the European level to identify, and counteract, macroeconomic imbalances at an early stage. The Single Supervisory Mechanism (SSM) for euro area banks and a framework for resolving insolvent banks have been brought about by the banking union. Macroprudential supervision targets the stability of the financial sector as a whole. To make the euro area even more resilient to shocks and increase its ability to act, deepening EMU will remain a key task in the years ahead. A recent report from the European Commission referred to four pillars that are key in supporting the smooth functioning of EMU: economic union, financial union, fiscal union and political union.

### **The euro is a success, despite the predictions of many skeptics – but the project needs to be completed**

In his welcoming remarks, President of SUERF *Jakob de Haan*, De Nederlandsche Bank, referred to Martin Feldstein, who in the late 1990s characterized EMU as a fragile institutional setup. The convergence criteria and the powers given to the ECB would, in Feldstein's view, not be able to ensure that the euro survived in a turbulent international environment. History has proved Martin Feldstein wrong. To underline the strength of the institutional backup of EMU, de Haan quoted ECB President Mario Draghi's famous statement of July 26, 2012: "Within our mandate, the ECB is ready to do whatever it takes to preserve the euro. And believe me, it will be enough." De Haan characterized the banking union as an important step forward. He stressed the need for a common deposit guarantee system, a fiscal stabilization system and more private risk-sharing.

*Jean-Claude Trichet*, Chairman of Bruegel, gave a keynote lecture on "EMU – from the past into the future." He started by referring to a friend, who 20 years ago was skeptical about the sustainability of EMU just like Martin Feldstein. His friend had said, "It will not work – forget about long-term sustainability." Trichet remarked that it took more than 100 years to establish a single market in the U.S.A. Thus, we should also consider Europe from a long-term perspective. Establishing the euro initially implied the huge task of merging the currencies of 12 countries. Since then, the number of euro area countries has grown to 19. It is an extraordinary achievement to establish a common currency by merging many national currencies and to provide price stability in the euro area for over 20 years. Many observers in New York and London, however, did not appreciate the broad political support for this impressive project. In terms of convergence, today's euro area of 19 countries is not as good as it should be, although the seven members that joined the euro area last have performed well in this respect. There certainly still exist considerable differences in living standards and economic growth, for instance between Greece and Germany. But similar differences can be found in the United States, e.g. between Mississippi and Massachusetts. In the coming years, more European governance

will be needed. Trichet listed many necessary steps, inter alia completing banking union and European capital markets union, improving macroeconomic risk absorption procedures, enhancing the role of the European Parliament in solving disputes, and introducing a euro area budget. While Trichet admitted that some of these steps are not popular at the moment, he found some consolation in the following quotation from Jean Monnet, “Premature decisions do not exist. Time will come for their implementation.”

### **Over the past 10 years, euro area monetary policy has been in crisis mode – new monetary policy practices and instruments are here to stay**

Session 1 on the topic “Toward a better EMU: past lessons, structural adjustments” was chaired by OeNB Governor Ewald Nowotny. Peter Mooslechner, former OeNB Executive Director, gave a presentation on “20 years of EMU, 10 years in crisis mode: what might the future new normal of monetary policy look like?” He characterized the last two decades of EMU as rather different: The years from 1999 to 2007 were the “golden years,” while the years since 2008 have been the crisis years. Mooslechner referred to a study by the Bertelsmann-Stiftung (2018), in which a number of people in the EU-28 had been asked: “Do you agree with the following statement: The world used to be a much better place?” The answers showed that, in particular, older people and Italians tended to agree. Mooslechner went on to compare the major central banks’ reactions to the 2007/2008 financial crisis. The ECB, the Fed and the Bank of Japan reacted in similar ways. They cut interest rates and expanded their balance sheets. Their reactions took place in a new economic environment characterized by structurally low inflation, low potential growth, low interest rates, the globalization of financial markets, higher financial market complexity, higher systemic risk, higher contagion risk and new regulation efforts. These factors caused significant changes in monetary policy implementation and operation. ECB tender operations were changed, and the ECB developed its own type of quantitative easing. Interest rate policy changed from simple interest rate setting to allowing for negative interest rates, and to a much more complex transmission of monetary policy decisions. Liquidity provision changed from providing for scarcity to targeting large-scale balance sheet expansion. Forward guidance was introduced as a new “art” of making monetary policy by expectations management. Steering the entire term structure of the yield curve has become an accepted and important interest rate policy tool. The maturity of central bank liquidity supply has become significantly longer. Mooslechner expected all these new instruments and approaches to be regularly used in the future if found necessary and appropriate.

### **A successful EMU needs flexible economies: euro area economies need to continue structural reforms**

Luiz de Mello, Director, Policy Studies Branch, OECD, gave a presentation on “Making the most of EMU: challenges and opportunity for reform.” He illustrated remaining gaps in living standards between the euro area countries. GDP per capita, for instance, is considerably higher in Luxembourg than in Greece. An important explanation of the observed differences are persistent productivity gaps. Productivity growth has declined in the EU as a whole, and it has been uneven. The countries in Central, Eastern and Southeastern Europe (CESEE) have experienced a relatively dynamic productivity development since 2002. The labor force participation rates

of women and older workers are higher in Northern Europe than in Southern Europe. Insolvency regimes differ considerably across countries. The handling of insolvency is much easier in Anglo-Saxon countries than in Eastern Europe. Statistics on outstanding loans and bonds of nonfinancial corporations (% of GDP) show that financing through the issuance of corporate bonds is much lower in the euro area than in the United States. In Europe, there is ample room for capital market expansion. Domestic sovereign bonds represent a high proportion in banks' portfolios, providing for a strong link between banks and their respective national governments. A 2018 OECD survey on the euro area contained recommendations aimed at strengthening the euro area's resilience to shocks by introducing a common fiscal capacity to support countries in difficulties. A dedicated euro area budget could reinforce EMU in the long run. Funds from this budget could be used for energy transition, security, defense, immigration and national debt restructuring. A pre-funded common deposit insurance scheme could reduce financial fragmentation and increase private risk-sharing.

### How to escape post-crisis secular stagnation? Five scenarios

Session 2 on “Monetary and financial stability” was chaired by OeNB Vice Governor *Andreas Ittner* and started with a lecture by *Martin Wolf*, Associate Editor and Economics Commentator, *The Financial Times*, on “Escaping the trap: secular stagnation, monetary policy and financial fragility.” In a diagram, Wolf traced the development of the Bank of England's lending rate from 1694 to 2019. Only in the most recent years, the interest rate has been below 2%. From 1992 to 2018, the yield on British ten-year gilts fell from 5% per annum to -2% per annum. In Japan, the interest level has been close to zero since 1990. In recent years, core consumer price inflation in the United States, the U.K., Japan and the euro area has fluctuated between zero and 3% per annum. Since 2007, aggregate private and public debt in relation to GDP of mature economies has remained rather stable at around 370%. Global indebtedness did not fall significantly after the 2007/2008 crisis because a huge credit bubble in China began to develop when the credit bubble in Western countries burst. We are living in a secular stagnation age. Global demand is structurally weak, with population aging and a massive growth in savings contribute to this weakness. How might this end? Wolf saw five possibilities: First, interest rates remain consistently below long-term nominal growth. Demand becomes structurally stronger. Exceptional monetary (and fiscal) policies are withdrawn. Economies grow out of indebtedness. Second, the status quo continues, with ultra-low interest rates, but also with a tolerable growth of nominal and real GDP. Third, there is an inflationary surprise. Central banks fail to respond quickly. So the real burden of debt is substantially reduced, as in the 1970s. Fourth, policy generates an inflationary surprise, central banks raise rates sharply. Debt liquidation ensues, along with another financial crisis. Fifth, there is an unexpected, deep downturn, perhaps because of a policy shock or perhaps for some other reason. Central banks are unable to respond. Again, there will be debt liquidation and a deep recession. Wolf concluded that we are in a global policy trap and need to find a way out.

### **Monetary and financial stability are closely interlinked and should be coordinated**

*Ed Sibley*, Deputy Governor of the Central Bank of Ireland, spoke about “The banking union and financial stability in the euro area.” He explained that the Central Bank of Ireland has a very broad mandate. Policy decisions are taken with a holistic view. The basic philosophy is that the financial system should serve the Irish economy. Transparency and accountability are basic principles. Supervision focuses on individual financial institutions. Macroeconomic stress testing is, however, also essential to individual firms. Financial stability is taken care of both at the level of individual institutions and at the systemic level. Coordination is also required between the national and the European levels. Sibley mentioned several important European initiatives. The Single Resolution Mechanism (SRM) aims at minimizing the economic impact of bank failures and is thus of primary importance to financial supervisors. Interconnectedness and aggressive use of leverage can make crises very expensive. To increase resilience, however, much more has to be done: We need to complete banking union.

### **Monetary and fiscal stability are closely linked – fiscal policy must find the balance between discipline and economic stabilization**

Session 3 on “Monetary and fiscal stability” was chaired by *Ernest Gnan*, Head of the OeNB’s Economic Analysis Division and Secretary General of SUERF. *Gottfried Haber*, designated OeNB Vice Governor as from July 2019 and President of the Austrian Fiscal Advisory Council, gave a presentation on “Strengthened EU fiscal framework: fiscal discipline versus economic stabilization.” Historically, fiscal policy has had a deficit bias in many countries. Among the main reasons for such a bias are political short-sightedness, moral hazard, lack of transparency, fiscal illusion and biased official forecasts. According to Alexandre Lamfalussy (1989), the main rationale for the inclusion of fiscal rules and the “no bailout” clause in the Maastricht Treaty was that the constraints imposed by market forces might either be too slow and weak or too sudden and disruptive. Since the financial crisis of 2007/2008, a number of steps have been taken in order to strengthen economic governance in the EU. The Stability and Growth Pact has been supplemented by the 2012 Fiscal Compact, the 2013 Two-Pack and several other measures. Independent Fiscal Institutions (IFIs) have become compulsory parts of the economic governance process. IFIs can contribute to better fiscal discipline. By supporting high transparency and quality standards, IFIs can improve the quality of the official information fiscal policy decisions rely on. Since 2008, the number of numerical fiscal rules in force in EU Member States has grown. Haber referred to a number of studies on the impact of fiscal rules on fiscal discipline. The results vary. Gaspar & Amaglobeli (2019) require a fundamental reform of EU fiscal rules. They argue for simpler and more transparent rules that better align political incentives with rule compliance. By way of conclusion, Haber said that improving the quality of public finances is key to easing tradeoffs between consolidation, equity and long-term growth objectives. From a longer-term perspective, fiscal policy should be framed by fiscal rules that are complemented by a well-designed institutional framework in which fiscal councils play a key role. A central fiscal capacity in the euro area might counteract asymmetric shocks without violating fiscal rules.

### Overcoming fiscal and financial vulnerabilities requires taking precautions and building up buffers in good times

*Ludger Schuknecht*, Deputy Secretary-General at the OECD, lectured on “Fiscal financial vulnerabilities.” He started by looking at data on general government deficits and debt as percentages of GDP in seven large economies. From 2007 to 2017, both deficits and debt increased in France, Japan, Italy and the U.S.A.. Thus, these countries – and many others – have low fiscal buffers. Also, in the most recent years characterized by positive economic developments, few countries have carried out fiscal consolidation. Due to maturing public debt and continued deficits, many countries have had total financing needs of between 13% and 40% of GDP since 2018. Public finances are vulnerable to changes in asset prices and taxes. Since 2010, bank equity capital has increased in most European countries, but there are still large nonperforming loans. Since 2007, nonfinancial corporate debt, loans and debt securities (as percentages of GDP) have fallen in a few countries, but debt levels are still high, e.g. in Belgium, France and Ireland. Data on public debt ownership show that in Italy, financial institutions own a high proportion of government bonds. Among EU investors, in turn, French institutions and investors have a large exposure to Italy. The factors historically correlated with the fiscal costs of crises comprise high aggregate private debt, high public debt, weak financial institutions, weak regulation and supervision, regulatory forbearance and promises for bailouts for banks and depositors. In his conclusion, Schuknecht recommended to build buffers in good times, implement fiscal rules, strengthen bank balance sheets and extend financial regulation to cover shadow banks.

### Stable money needs sound public finances – the Austrian example

In his address, *Hartwig Löger*, Austria’s Minister of Finance, thanked Governor Nowotny for the excellent cooperation with the Ministry of Finance, adding that he hoped to benefit from the Nowotny’s economic policy advice also after the governor’s retirement in August 2019. Löger then explained that as monetary policy and fiscal policy were getting increasingly interconnected, he was going to build his opening address on some reflections about Austrian fiscal policy. He illustrated the importance of a tax reform in Austria, arguing that the government wanted to demonstrate that fiscal discipline is not incompatible with tax cuts.

### The international role of the euro: from start-up to scale-up

Session 4 focused on “The international role of the euro” and was chaired by *Martin Summer*, Head of the OeNB’s Economic Studies Division. The session was opened by *Kerstin Jorna*, Deputy Director-General of the European Commission’s Directorate-General for Economic and Financial Affairs (DG ECFIN), who outlined her vision for the euro’s future in a presentation entitled “From start-up to scale-up: the global role of the euro.” Jorna started out with a quote by Robert Mundell, who once stated that “Great powers have great currencies.” From there she went on to revisit the euro’s positive development within its first 20 years. She pointed out that the euro had been quick to become the world’s second most important reserve currency and that it brought considerable benefits to European citizens and companies. Against this background Jorna then posed the question, “Is the euro great enough?” A stronger euro could have clear benefits for Europe, such as lower economic and political dependence on the increasingly unpredictable U.S.A. and the U.S. dollar.

Moreover, a stronger euro would also be necessary to support the EU's stronger role in a multipolar world. For Jorna, there is no question that we should aspire for the euro to become the world's leading currency, and she therefore described how, from a business perspective, the product (in this case, the euro) could be taken from its startup phase, i.e. its first 20 years, to its scale-up phase, which, in her view, should start immediately. To strengthen the use of the euro in the next 20 years, there are five "boosters" that we should focus on: suppliers (euro-denominated bond issuance), customers (use of the euro in payments and reserves), distribution channels (euro payment infrastructures and market places), after-sales servicing (strengthening the euro area from the inside) and capital (building political capital and trust capital).

**The euro has become the second most important international currency – but the euro area institutional setup will require further development for the euro to assume the leading role**

*Arnaud Mehl*, Principal Economist at the ECB, elaborated on "The euro's global role: past, present and future." Mehl began by discussing the euro from a historical perspective, emphasizing the contradicting views about its prospects at the point of introduction and confronting these with statistical evidence about its subsequent development. With hindsight, the euro may have fared better than the most pessimistic observers predicted, seeing a steady increase in the use as a reserve currency since its inception. Yet, when the crisis came, market doubts about the resilience of the euro area grew, and the use of the euro – and thus its international role – started to decline to a level not far from where it had started out, and has remained at these low levels ever since. From a long-run perspective, however, it seems that the euro has successfully established itself as the second most important reserve currency in the world and has taken the place that the pound sterling occupied immediately before the collapse of the Bretton Woods system. Against this historical background, Mehl developed three arguments why the global role of the euro matters. First, global financial cycles need to be understood in relation to the U.S. dollar's predominance and might be mitigated to some extent if that role was less pronounced. Second, dominant currency pricing leads to a considerable effect of U.S. monetary policy on the rest of the world's trade volumes and prices. Third, there is ample evidence that the U.S.A. can and does use the U.S. dollar's dominant position to advance its own economic and geopolitical interests. In his outlook, Mehl stressed that stronger euro area resilience is crucial to strengthening the euro's international role and that this requires the completion of EMU and banking union. Furthermore, and bearing in mind the historical development of the U.S. dollar, creating a truly single, deep and liquid European capital markets union may also play an important part in promoting the global status of the euro.

### Strengthening the foundations of the euro – Kamingsgespräch with Peter Praet Trust is key to successful currency and monetary policy

At the end of the first conference day, OeNB Governor **Ewald Nowotny** welcomed **Peter Praet**, Member of the Executive Board and Chief Economist at the ECB, to the traditional **Kamingsgespräch** to discuss about current monetary policy issues. Praet opened with a brief introductory statement on “Strengthening the foundations of EMU” and went on to point toward the puzzle that current surveys frequently reveal high approval ratings of the euro throughout the euro area, while people’s trust in the ECB is commonly found to be relatively low. Such findings are, of course, not only true for the ECB but apply, on a more general basis, to many European and national institutions. Still, policymakers should take these doubts seriously and be self-critical when looking for the reasons behind such survey results. Praet therefore questioned whether the ECB’s monetary policy is accessible and comprehensible enough to the broader public, especially the less educated. Indeed, there is an educational divide in trust. But trust is also related to how institutions act and communicate, and to the expectations people form on this basis. Even though the ECB has always been remarkably successful in achieving its primary objective, i.e. price stability, inflation expectations since the crisis have at times diverged somewhat from the ECB’s price stability definition. Historically, this lack of trust could be linked to several episodes such as exaggerated political promises of the benefits of the euro, which might have fueled high expectations, or the ECB’s involvement in the EU Troika during the sovereign debt crisis, which might have led people to see the ECB as a political institution. Even more seriously, at the zero lower bound of interest rates, the extension of the list of eligible assets for monetary policy operations involving quantitative easing may have opened the door to demands for asset purchases in areas that go beyond the monetary policy objective. Furthermore, people might not have always well understood the ECB’s increasing responsibility in the realm of financial stability, which is not explicitly part of its mandate. Given these experiences, Praet advocated that central banks should take the perceptions of the general public into account and should be very careful not to suggest anything else than a narrow focus on their price stability mandate.

#### The crisis triggered useful reforms in the euro area

As Europe consists of small economies, its prosperity depends on openness. Openness can, however, only lead to prosperity if it is accompanied by an institutional framework. The European integration process has provided such a framework for joint prosperity but there have been large shocks to the process. Not all the distributional consequences of these shocks have been well managed. Yet, while the single currency prevents countries with excessive debt to use inflation to “nominally grow out of debt”, it has brought stability and successfully prevented disorders that were common in the past, such as currency crises. Even the financial crisis for which no provisions had been made in the initial institutional design of the union, led to a number of promising policy developments, some of which still remain to be completed. To reduce procyclicality, the liability sides of banks’ balance sheets should be more diversified, and further steps toward capital market union must be taken. The completion of banking union should be a top priority, and it is of strategic relevance to reveal to the banking sector as soon as possible what its future regulatory environment will be.

### Are central bank digital currencies the future? If yes, how could they be designed?

The second conference day was opened by OeNB Executive Director *Kurt Pribil*, who chaired session 5 on “Digitalization of money: future challenges.” *Ulrich Bindseil*, Director General of Market Operations at the ECB, gave a comprehensive presentation on “Central bank digital currency – financial system implications and control.” Bindseil started from the observation that discussions about Central Bank Digital Currency (CBDC) are often bundled with idealistic, conservative and fearful attitudes and sometimes also with technological confusion. By focusing on a case in which CBDC would be offered to the general public as conventional deposit money, he attempted to discuss the implications of such a policy from a more pragmatic perspective. Historically, broad-access central bank accounts were not uncommon and have only become less popular among central banks during the last century. Even today, however, nonbank accounts with central banks exist even within the Eurosystem. Bindseil distinguished two effects of CBDC: households substituting CBDC for banknotes (CBDC1) and households substituting CBDC for commercial bank deposits (CBDC2). He then discussed the potential impact of CBDC1 and CBDC2 on the financial structure using a financial accounts and flow-of-funds representation. In the case of CBDC1, central bank and commercial bank balance sheets would not change substantially. For CBDC2, however, commercial banks could experience an erosion of their deposit base and— to avoid “disintermediation” — would have to provide more favorable conditions on their deposits, which would in turn increase their funding costs. In reality, it is likely that a combination of both effects would occur. While CBDC1 would have an a priori neutral effect on the financial accounts, the central bank would have to compensate for CBDC2, e.g. by lowering its policy rates, if it wanted to keep financial conditions unchanged. Furthermore, CBDC could potentially increase the risk of bank runs. Nevertheless, in keeping with and extending the literature on the subject, Bindseil identified conditions under which well-designed CBDC need not necessarily alter the financial structure or provide new systemic risks. Overall, Bindseil concluded that a solid case for CBDC could be made for the sake of efficiency and public involvement in retail payment systems, particularly where the use of banknotes is in decline and where people want CBDC. Yet, CBDC’s potential consequences on the financial system and its stability have to be taken seriously, and Bindseil envisioned a two-tier system in which lower interest rates would be paid above a certain threshold to encourage the use of CBDC as a means of payment but to discourage its use as a large-scale store of value or safe haven investment. Bindseil explained that two-tier remuneration could be effective to control the quantity of CBDC and thereby the size of the central bank’s balance sheet, but that this would not be equivalent to controlling CBDCs’ impact the structure of the financial system at large. Still, if CBDCs were well managed, changing the structure of the financial system per se might not be wrong.

### How risky are crypto assets? A taxonomy

*Andrei Kirilenko*, Director of the Centre for Global Finance and Technology at the Imperial College London, continued with “A risk-based taxonomy of crypto assets.” For Kirilenko, recent developments in the crypto economy somewhat resemble the Cambrian explosion of species in that the number of crypto assets, the amounts invested in them and their complexity are increasing dramatically. Kirilenko also



saw a link between the development of crypto currencies and a variant of Moore's law, namely the observation that "the number of computations conducted by an integrated circuit at the same cost increases exponentially." At some stage in the early 2000s, computing power became strong enough for complex cryptographic puzzles to be solvable on standard PCs. Moreover, online communication facilitated the development of decentralized self-sustaining computational ecosystems that could be governed by distributed ledger technology and thus provided a basis for the subsequent explosion of digital, yet scarce assets. In order to make sense of these crypto asset developments, Kirilenko offered a risk-based taxonomy in which different types of assets are ranked according to their expected return and their risk of not being adopted. Although, at this point, probabilities of adoption are extremely uncertain for most crypto assets, adoption probabilities are generally a function of asset security, i.e. technological vulnerability, and stability, i.e. vulnerability to governance risks. The four main types of crypto assets can therefore be ranked by increasing expected returns and increasing risk of nonadoption as follows: CBDC, stable coins, crypto currencies and crypto tokens. To illustrate his point, Kirilenko discussed the first and last of these asset types in greater detail. For CBDC, here broadly defined as a digital form of central bank money different from balances in traditional reserve or settlement accounts, the risk of nonadoption could be kept close to zero since a central bank can, in principle, make its use mandatory and the expected return could even be negative since safe and liquid central bank deposits may at times be valuable in themselves. CBDC would make sense in economic areas with a strong digital economy, for which access to a secure payment system with an ultra-liquid and digitally native asset would be beneficial. Crypto tokens, i.e. representations of assets or utilities on a blockchain, are the opposite of CBDC as they involve high risks of nonadoption, i.e. high rates of failure, but also high expected returns. Having some similarities with company shares in the crypto realm, tokens are meant as investment or participation vehicles for risky digital projects. The risk-based perspective on crypto assets provides further insights into a rapidly developing segment that poses many questions regarding regulation and calls for the attention of central banks and regulators, financial institutions and global technology platforms. During the ensuing discussion, Kirilenko said that after a learning period, people have now become used to the fact that bonds are no longer issued in paper form. Maybe after some years of seeing digital money and crypto assets, they will also become used to a world in which money is no longer issued in paper form.

### **EMU involves complex integration and convergence dynamics**

*Doris Ritzberger-Grünwald*, Director of the OeNB's Economic Analysis and Research Department, chaired the final session on "Completing European Economic and Monetary Union." The first presentation on "The complex dynamics of integration and convergence in EMU" was held by *Bruno Cabrillac*, Deputy Director General of Economics and International Relations at the Banque de France. Cabrillac began by giving an overview of the multitude of institutional innovations that have occurred or are under way in the EU since the onset of the financial crisis. Although significant progress has been made, two strong red lines currently remain in the European policy discourse: the mutualization of debt, and permanent public transfers. Next, Cabrillac attempted to provide an outlook for the next 20 years of EMU by examining

statistical evidence from the past 20 years. Real convergence as measured by GDP per capita can mostly be observed for EU countries which are not part of EMU or which joined the euro area later, while there actually seems to be a trend toward divergence for initial euro area countries. Projecting current trends into the future, further real divergence seems likely. Another trend that should receive more attention is the rise of old age dependency ratios that, although occurring in all countries concerned, also contributes to divergence. If there were perfect labor mobility within EMU, real divergence would be reduced to a problem of regional planning. However, the integration of EMU labor markets is only weak, with barriers ranging from language barriers to policy obstacles like cross-border pension portability. Furthermore, levels of education and public expenditure on education differ considerably across countries. For all these reasons, idiosyncratic shocks would persist while structural divergence would continue, both of which indicate the further need for risk-sharing. Yet, there is a difficult tradeoff between risk-sharing and risk reduction, since first, public debt levels and paths as well as GDP growth and current account balances are diverging; second, there is a connection between bank and sovereign resilience; and third, higher labor mobility might also have a negative effect by worsening potential output for structurally weaker regions in the long term. The question arises whether banking union and capital markets union, if fully implemented, would even be enough. Considering this, Cabrillac formulated his 2038 agenda: fully implement the single market, including that for financial services, strengthen institutional integration, promote labor market integration and raise and harmonize education levels.

### **How to reform and deepen the euro area? Reconciling risk-sharing with market discipline**

*Isabel Schnabel*, Professor of Financial Economics at the University of Bonn and Member of the German Council of Economic Experts, gave the final presentation on “Reconciling risk-sharing with market discipline: a constructive approach to euro area reform,” based on a report by the Centre for Economic Policy Research (CEPR) which she co-authored with a group of internationally renowned scholars. Schnabel began by providing a brief diagnosis of the current state of the euro area, which is codetermined by the slowing expansion of the global economy and the slowing expansion at home, and currently also faces high risks such as trade conflicts, Brexit and the resurgence of a possible euro area crisis. On the upside, significant progress has been made since the last euro area crisis, and several institutional improvements (e.g. banking union, the European Stability Mechanism, the reform of the Stability and Growth Pact) and regulations (e.g. Basel III and macroprudential regulation) have been implemented. Nevertheless, public debt levels remain high in many euro area countries, most of which exhibit little fiscal space for the next crisis. What is even worse, there might as well be limited monetary space in case of another crisis or recession as monetary policy has still not been normalized and the European banking sector remains weak. While risk-sharing is still insufficient in the euro area at large, recent developments in Italy are sending new warning signals. While recently, EU membership has at least started to become more popular again, even this observation is accompanied by large differences across EU countries, with anti-European movements apparent in some. Overall, the status quo remains unstable. Crisis management has increased political tensions in Europe

and led to discontent of both debtor and creditor countries. Schnabel identified certain types of political “philosophies” across Europe that have created a deadlock, preventing further reform and thereby threatening stability. In this context, Schnabel distinguished between what she called the “German” view and the “French” view. The “German” view propagates the unity of liability and control, more market discipline and incentive compatibility, fiscal discipline and enforceable rules, and the notion that there should not be a transfer union. The “French” view, by contrast, propagates insurance against asymmetric shocks, the avoidance of procyclicality, and the need for “safe assets.” These views also imply different solutions to current euro area policy problems. While the “German” view prescribes the orderly restructuring of sovereign debt, credible fiscal rules with sanctions, and removing privileges for sovereign exposures, the “French” view prescribes fiscal capacity, European deposit insurance and “safe assets.” Schnabel, however, argued that these views do not really demand a political compromise but are an economically consistent approach only if taken together. The central hypothesis of the CEPR report was therefore that risk-sharing and market discipline are complements. The authors argued that “1) Risk-sharing without discipline induces moral hazard and is not sustainable in the long run. 2) Disciplining devices based on administrative or political procedures alone are hard to enforce. 3) Market discipline without risk-sharing is destabilizing and therefore not credible.” Hence, they concluded that both risk-sharing and market discipline are necessary. From this perspective, Schnabel then developed a reform program for the euro area with the following essential elements: strengthening the financial architecture (breaking the sovereign-bank nexus, creating a European banking and capital markets union), raising the credibility of the fiscal framework (making the expenditure rule less procyclical and more easily enforceable, enabling the credible restructuring of sovereign debt as the last resort) and increasing stabilization through a European unemployment reinsurance (based on an incentive-compatible design and without permanent transfers). Schnabel concluded that although reforms might come too late to deal with current issues, they may help stabilize expectations about the future of EMU. The euro area should therefore agree on an incentive-compatible design of risk-sharing mechanisms, because, as she said, “Our future is Europe –we do not have another one.”

*This OeNB-SUERF conference has been the tenth joint OeNB-SUERF event since 2008 and the second annual Economics Conference the OeNB and SUERF organized together. The conference also offered a welcome opportunity to formally recognize Governor Nowotny’s and the OeNB’s long-standing support for SUERF. In recognition of Governor Nowotny’s services to the European integration project and his commitment to the causes of SUERF, SUERF President Jakob de Haan and SUERF Secretary General Ernest Gnan awarded Governor Nowotny honorary membership in SUERF.*