



# AUSTRIA

## SELECTED ISSUES

May 2024

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**International Monetary Fund**  
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# AUSTRIA

## SELECTED ISSUES

April 19, 2024

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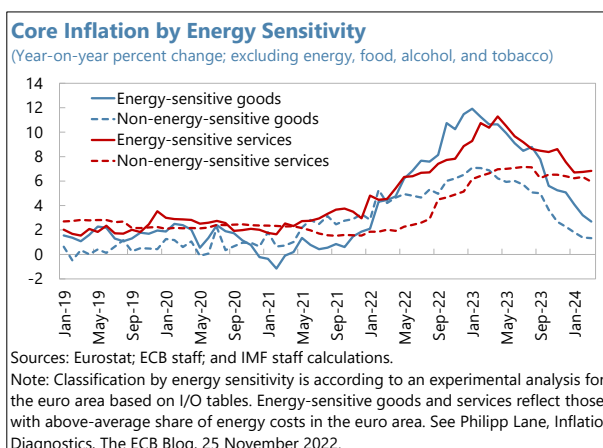
## DRIVERS OF CORE INFLATION IN AUSTRIA

Inflation in Austria has declined on falling energy prices, but the pace of its return to the two percent target is uncertain. To gain insight into the likely pace of disinflation, this chapter examines key drivers of core inflation from two perspectives. First, it explores how energy prices have affected core inflation by examining differences in inflation trends between core goods and services with a relatively high energy-input content versus those with a relatively low energy-input content. Second, the chapter uses a parsimonious econometric model to generate forecasts of core inflation. The chapter concludes that there are good reasons to expect core inflation to keep falling as lower energy prices continue to pass through to core prices and as euro-area inflation, a key determinant of Austrian inflation in the econometric model, continues to fall. However, staff do not project Austrian inflation to reach the two percent target for some time, given inflation's current elevated level and somewhat sticky services inflation.

### A. The Role of Energy Prices in Recent Core Inflation Developments

#### 1. The energy-price shock has played an important role in core inflation's evolution over the past two years.

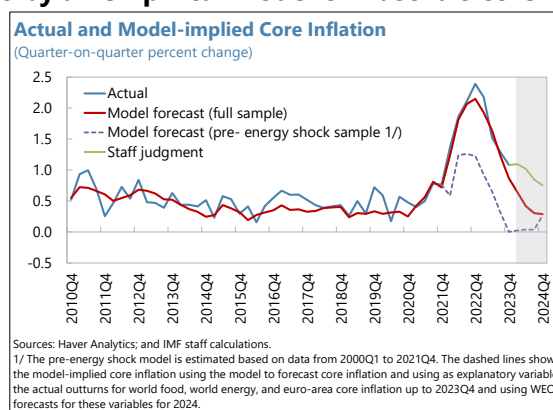
- Among energy-sensitive core goods and services, inflation rose rapidly after Russia's invasion of Ukraine, suggesting strong pass-through of high energy prices into core prices. As energy prices have since declined, inflation rates for energy-sensitive core goods and services have also declined.
- Inflation for non-energy-sensitive goods rose by less than for energy-sensitive items (though still peaking in 2023 at three times its pre-war level) and has now begun to decline rapidly.
- However, inflation for non-energy-sensitive services appears to be stickier, with this inflation rate remaining broadly flat and elevated at around 6 percent since early 2023. This stickiness could reflect a number of factors, including a post-pandemic global rebound in the demand for services and stronger effects of high wage growth on services inflation.<sup>1</sup> If these forces do not abate quickly, the resultant stickiness in services inflation may slow the decline in aggregate core and headline inflation.



<sup>1</sup> However, some evidence suggests that wage growth has not yet been a key driver of inflation, see [WIFO Research Briefs, 9/2023](#).

## B. How Quickly Could Inflation Return to Target?

**2. Staff are guided in their inflation projections by an empirical model of Austria's core inflation.** We estimate a model of quarterly growth in seasonally adjusted HICP that includes lags of Austrian core inflation and both contemporaneous and lagged values of euro-area core inflation, world energy price inflation, and world food price inflation.<sup>2</sup> The sample period is from 2001Q1 to 2023Q4. The results (Appendix I) indicate the model has an overall good fit, with a high R-squared, and suggests that euro-area core inflation is a key driver of core inflation in Austria.



**3. However, the model has consistently underpredicted the persistence of core inflation during the recent energy-price shock.** To see this, we estimate the model using only data before 2022 and then use this estimated model to project inflation during 2022–23, using actual outturns for world energy and food prices and euro-area inflation as explanatory variables. This model's forecasts (dotted purple line in the text chart) would have significantly underpredicted actual inflation during 2022–23. This may reflect that inflation dynamics during periods of large shocks may differ from dynamics during the period of highly stable inflation from 2000–19. Given these recent errors in the model's predictions, staff projects a somewhat slower decline in core inflation than predicted by the full model (text chart).

## C. Conclusion

**4. Inflation is expected to continue declining in Austria, but it may be some time before it reaches the two percent target.** This chapter finds several stylized facts that are relevant for the inflation projection. First, falling energy prices have contributed to a sharp decline in goods inflation, but services inflation remains somewhat sticky, especially services that do not have a large energy-input content and thus may not be highly affected by further pass-through of lower energy prices into lower core inflation. Second, a simple econometric model suggests that the expected decline in euro-area inflation will put significant downward pressure on Austrian inflation, but the model has tended to under-project inflation during the energy shock. Taking these and other factors into consideration, staff expect core and headline inflation to continue falling but that it will take some time (at least 2025) before inflation reaches the two percent target, given inflation's current elevated level and sticky services inflation.

<sup>2</sup> This specification allows forecasting Austria's core inflation using IMF WEO projections of world food and energy prices and euro-area inflation forecasts.

## Appendix I. A Model of Austria's Core Inflation

**1. Staff forecasts of Austria's core inflation are informed by a parsimonious model.** This model regresses quarter-on-quarter core inflation (seasonally adjusted HICP excluding energy and unprocessed food prices) on its own lags and on contemporary and lagged values of euro-area core inflation and WEO international food and energy prices. The number of lags for each variable is set so as to minimize the Akaike information criterion. The advantage of this simple model is that IMF forecasts of euro-area core inflation and food and energy prices can be used to forecast Austrian core inflation. The sample period is from 2000Q1 to 2023Q4. Table 1 below displays the results. The model has a good fit and shows a strong relationship between euro-area and Austrian core inflation, along with its own lags.<sup>1</sup>

**Table 1. Austria: Baseline Model of Core Inflation**

<b>ARDL(4,0,2,4) regression</b>		<b>Regression Statistics</b>	
Included observations	91	R-squared	0.8469
Sample	2001Q2 - 2023Q4	Adjusted R-squared	0.8211
Dependent Variable	INF_CORE	S.E. of regression	0.0018
		Sum squared residual	0.0002
		Log likelihood	453.9873
		F-statistic	32.7670
		Prob(F-statistic)	0.0000
		Mean of dependent variable	0.0058
		S.D. of dependent variable	0.0042
		Akaike info criterion	-9.6700
		Schwarz criterion	-9.2838
		Hannan-Quinn criterion	-9.5142
		Durbin-Watson stat	2.1364

<b>Variable Definitions</b>	
INF_CORE	Austria core inflation
INF_CORE_EAF	EA core inflation
INF_FOODF	World food inflation
INF_ENERGYF	World energy inflation

<b>INF_CORE</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.*</b>
INF_CORE(-1)	0.27340	0.09455	2.89149	0.00498
INF_CORE(-2)	0.04107	0.10241	0.40101	0.68953
INF_CORE(-3)	0.03795	0.09875	0.38432	0.70180
INF_CORE(-4)	0.24679	0.11108	2.22180	0.02923
INF_ENERGYF	0.01635	0.00852	1.91921	0.05866
INF_FOODF	0.04282	0.02189	1.95624	0.05406
INF_FOODF(-1)	0.04786	0.02476	1.93283	0.05693
INF_FOODF(-2)	0.05343	0.01894	2.82086	0.00609
INF_CORE_EAF	0.24014	0.16384	1.46565	0.14682
INF_CORE_EAF(-1)	0.21523	0.10790	1.99475	0.04961
INF_CORE_EAF(-2)	0.24230	0.11704	2.07021	0.04179
INF_CORE_EAF(-3)	-0.34291	0.11043	-3.10534	0.00266
INF_CORE_EAF(-4)	-0.18273	0.14315	-1.27648	0.20562
C	0.00049	0.00037	1.32931	0.18767

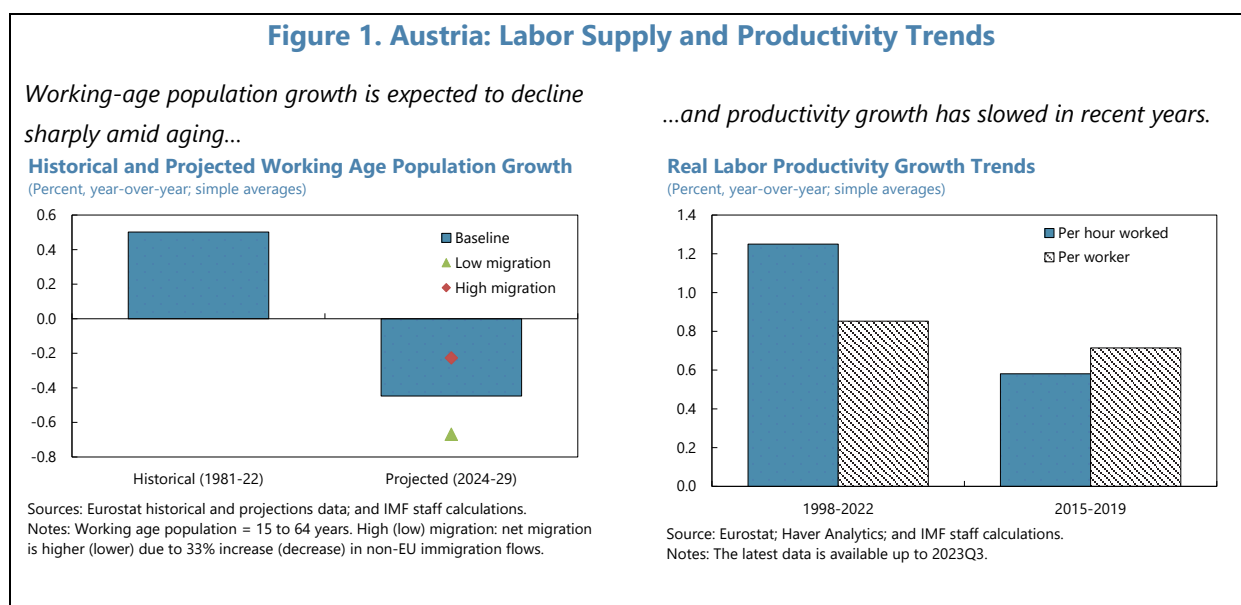
\*Note: p-values and any subsequent test results do not account for model selection.

<sup>1</sup> Staff also estimated models that included measures of the output gap and unit labor cost growth, but these variables did not significantly improve the model's fit.

## ENHANCING LABOR SUPPLY TO BOOST MEDIUM-TERM GROWTH

Austria faces a significant decline in labor supply growth over the medium term. As in most EU countries, demographic projections see the growth rate of the working-age population (WAP) being negative over the next five years (and beyond). The decline in the growth of labor supply will exert a drag on Austria's potential growth. At the same time, significant gaps are observed in the participation of females and elderly in the labor force compared to other European countries. Closing these gaps could help offset the effects of demographic aging. In this context, this chapter focuses on options to reduce constraints on female and elderly participation in the labor force. It also discusses options for enhancing migrant integration into the workforce.

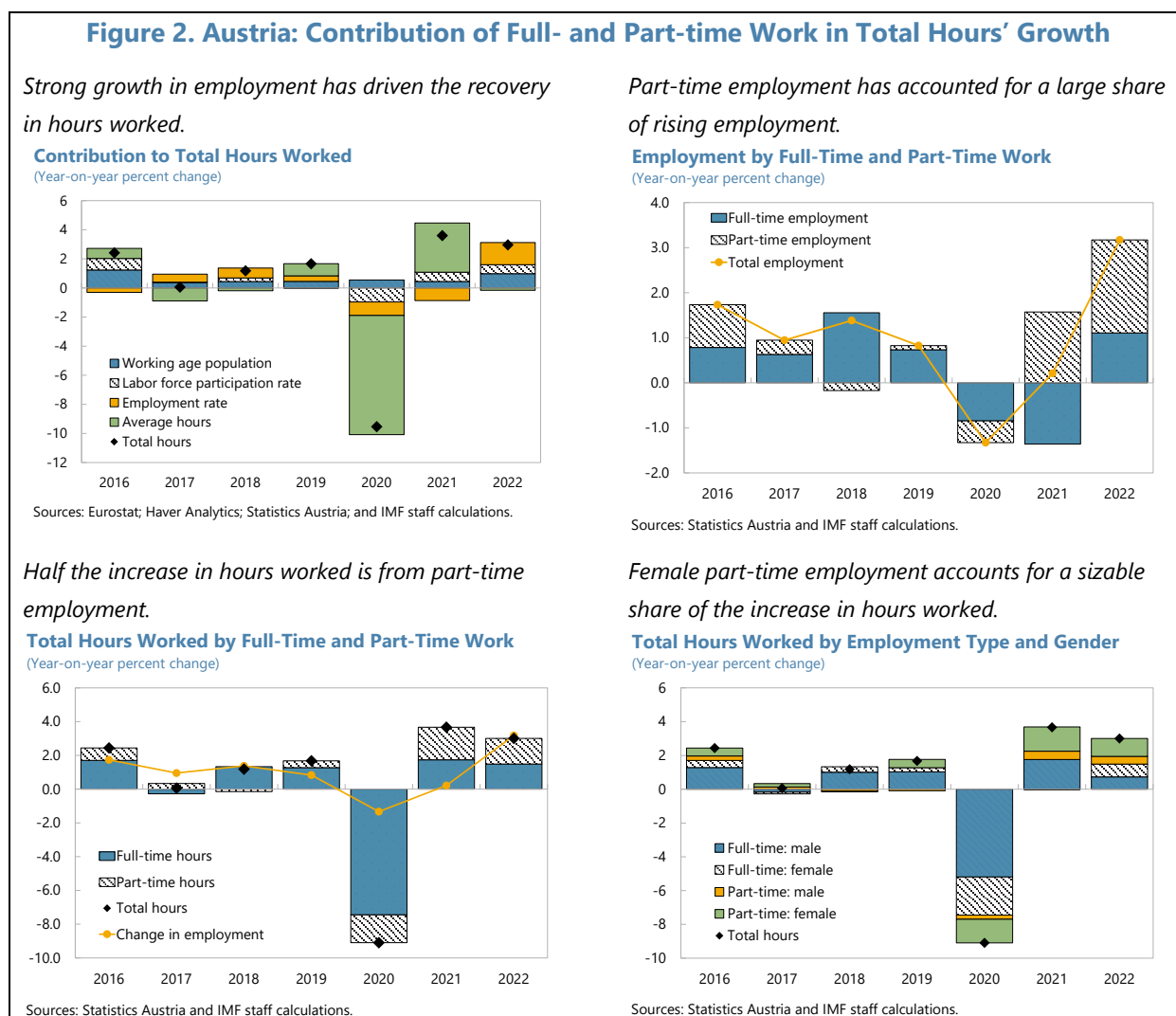
**1. Population aging in Austria poses significant headwinds for growth over the medium term, heightening the need to explore options for increasing labor supply.** The growth rate of the working-age population is set to decline, and productivity growth has also slowed (Figure 1). Consequently, it is useful to explore reforms that can increase labor supply and thereby help offset these headwinds for growth. Toward this end, this chapter assesses (i) recent developments in the growth of total hours worked and changes in the composition of hours worked; (ii) gaps relative to other European countries in Austria's labor supply parameters (WAP ratio, participation rate, unemployment rate, and average hours per worker) across age cohorts and gender; and (iii) policies to boost labor supply, focusing on closing gender and age gaps in labor force participation and hours worked.



## A. Recent Developments

### 2. The labor market recovery since COVID has been driven strongly by part-time work.

Part-time hours worked accounted for a higher share of the total-hours growth during 2021 and 2022 than in previous years, reflecting the larger share of part-time employment in total employment growth over this period (Figure 2). Significantly increased female part-time work is a key driver of the increase in total hours, about a third of the total in 2022.



### 3. The increased share of part-time work in total hours relates in part to the success of Kurzarbeit in containing the increase in unemployment during COVID.

The take-up of the Kurzarbeit scheme in Austria peaked at record high levels (more than 1 million workers in April 2020, more than a quarter of the labor force in mid-2020). Though it fell to the range of about 200,000–400,000 workers the following year, this was still much higher than pre-COVID levels. During the global financial crisis, for example, this figure was only about 37,000 workers at its peak.



**4. Average hours per worker per week appear to have shifted down further since COVID-19.** Average hours have trended downward across Europe over time (Figure 3). Relative to pre-COVID, Austrian full-time workers' average weekly hours have declined from 36.7 hours per week in 2019 to 35.9 in 2022; those of part-time workers (whose share in total employment has risen from about 28 percent pre-COVID to about 31 percent) have remained broadly at the pre-COVID level of about 22 hours per week.

## B. Gaps in Labor Supply

**5. A cross-country comparison of labor supply parameters suggests that Austria lags in labor supply among certain groups of workers.** Figure 3 shows the distribution of labor market parameters in European countries, highlighting Austria. Aggregate labor supply in hours worked per capita (AHWpc) may be decomposed as  $AHWpc = WAPR \times LFPR \times (1-UR) \times AH$ , where WAPR is working age population *ratio*,<sup>4</sup> LFPR is the labor force participation rate, UR is the unemployment rate, and AH is average actual hours worked.

- **WAP ratio.** Austria has a relatively high WAPR (65.6 percent average over 2018–22, as compared to the median 64.2 percent for the selected European countries),<sup>5</sup> both for females and males. Even as the median WAPR has declined over time in Europe, migration appears to have helped support Austria's supply of workers over the past 25 years, given the relatively higher working-age share among non-citizens (73.3 percent, well above the sample median for migrants) as compared to Austrian citizens (63.9 percent, at the sample median for citizens of the sample countries).
- **LFPR.** LFPR is also around the median of the sample at 77 percent during 2018–22, rising over time with rising female participation. Across age groups, both male and female participation rates are well above the sample average between 15–59 years of age but drop to below the sample lower quartile—indeed to near the sample minimum for women—for the 60–64 years age group. Elderly female participation rates averaged 19.6 percent in 2018–22, compared to the sample median of 45.6 percent. The corresponding values for elderly males are 45.5 and 62.9 percent. Raising elderly participation rates to the median level for the sample would potentially add about 125,000 workers to the economy, equivalent to about 2.7 percent of the current labor force.
- **Unemployment rate.** Austria's unemployment rates have remained at relatively low levels through the past 25 years. Austria has also had success in reducing long-term unemployment in the years before COVID, from 2.5 percent in 2017 to about half that figure at end-2019.

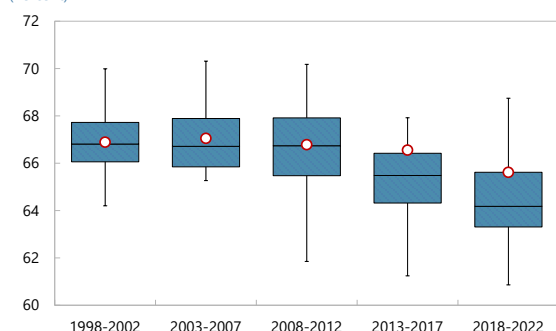
<sup>4</sup> To enable comparison across countries, WAP is expressed as a ratio to total population.

<sup>5</sup> Country sample: AT, BE, CH, CY, CZ, DE, DK, EE, EL, ES, FI, FR, HU, IE, IS, IT, LU, LV, MT, NL, NO, PT, SE, SI, UK.

**Figure 3. Austria: Distribution of Labor Supply Parameters 1/**

*Austria has relatively high WAP ratio.*

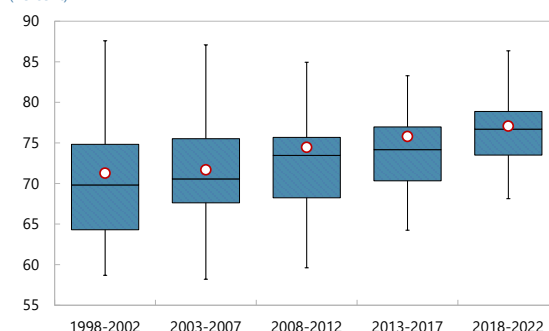
**Working Age Population to Total Population**  
(Percent)



Sources: Eurostat; Statistik Austria; and IMF staff calculations.

*LFPR is at the median overall.*

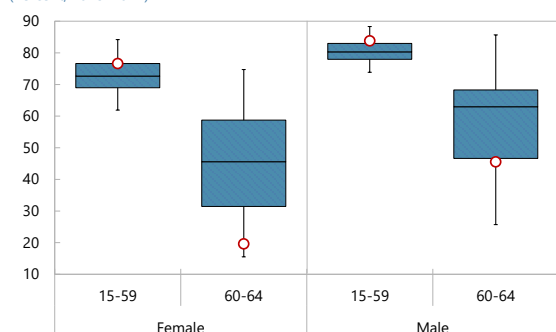
**Labor Force Participation Rate**  
(Percent)



Sources: Eurostat; Statistik Austria; and IMF staff calculations.

*But elderly workers have low LFPR.*

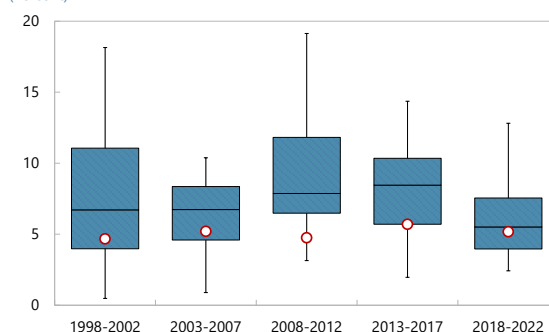
**Labor Force Participation Rate by Age Group and Sex**  
(Percent; 2018-2022)



Sources: Eurostat; Statistik Austria; and IMF staff calculations.

*Unemployment rates are typically low.*

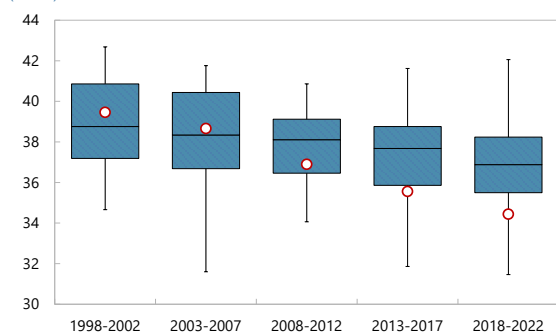
**Unemployment Rate**  
(Percent)



Sources: Eurostat; Statistik Austria; and IMF staff calculations.

*Average weekly hours worked have declined more than in other European countries.*

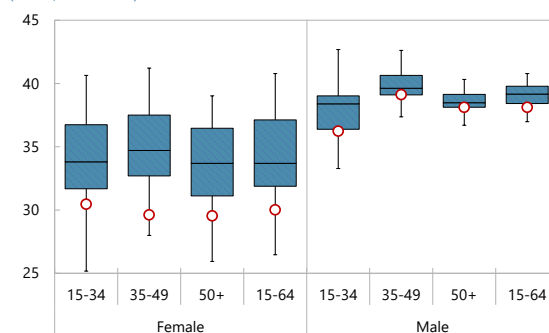
**Average Weekly Hours**  
(Hours)



Sources: Eurostat; Statistik Austria; and IMF staff calculations.

*Female average weekly hours worked gap is wider than for males at all age groups.*

**Average Weekly Hours by Age Group and Sex**  
(Hours; 2018-2022)



Sources: Eurostat; Statistik Austria; and IMF staff calculations.

1/ In this figure and in similar figures in this chapter, the top and bottom of the blue boxes correspond to the 75<sup>th</sup> and 25<sup>th</sup> percentiles, respectively; the top and bottom bars correspond to the maximum and minimum, respectively; and the red circle corresponds to the value for Austria.

- **Average hours (per worker per week).** Weekly actual hours worked have declined across the sample over time, with the median of the sample falling from somewhat below 39 hours to about 37 hours per week. In the early 2000s, hours worked per week in Austria exceeded the median, but in the last 5 years Austrian hours worked per week have fallen well below the sample median, to just over 34 hours per week, indicating a faster decline in Austria than in other countries. In 2018–22, females worked an average of 30 hours per week compared to the sample median of 33.6 hours per week, whereas males worked an estimated 38 hours per week, about 1 hour less than the median. Closing the gap in average hours relative to the median for males and, in particular, for females could potentially increase aggregate hours worked by about 7 percent.<sup>6</sup> However, significantly increased hours of work would likely require a compositional change in female work choices toward more full-time work.

## C. Zooming In: Drivers of Subdued Female and Elderly Participation

### Subdued Female Work Hours

**6. Responsibilities related to childcare and elderly care are reported as the predominant reason why females do not work full-time** (Figure 4). Over the average lifespan, engagement in part-time employment noticeably increases among females aged 25 to 39, years corresponding to childbearing and childcaring age, and then experiences a marginal decline but never returns to the levels observed at age 25. This pattern is distinctly absent among male counterparts. This is in line with 60 percent of women working fewer than 30 hours per week attributing this to domestic duties, childcare, or caring for others, a responsibility that only 10 percent of men report. In addition, 4.5 percent of females reportedly change jobs to accommodate childcare or other dependent care needs, compared to just 2 percent of men. These findings suggest that responsibilities of care may impose constraints on the hours worked by women.

**7. The supply of formal childcare arrangements is low, particularly for full-time care in some regions.** Financial cost is not a primary constraint in this context. The main constraint is rather the availability of childcare services that are open for the full working day, especially in regions other than Salzburg and Vienna and despite some improvements in childcare availability in recent years. This lack of childcare services correlates strongly with the prevalence of part-time work among females (Figure 4). Social attitudes towards women working, especially those with young children, also appear to play a significant role in shaping employment choices.

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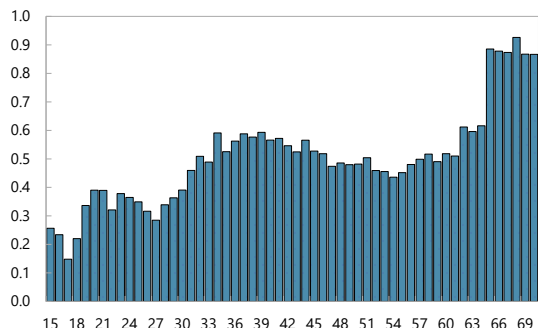
<sup>6</sup> Relative to the annualized aggregate hours worked in 2023Q2.

**Figure 4. Austria: Reason Women Working Part-time: Childcare and Elderly Care**

*Female part-time work picks up around 30 years-old...*

**Female Part-Time Work by Age, 2019**

(Percent of total female workers)

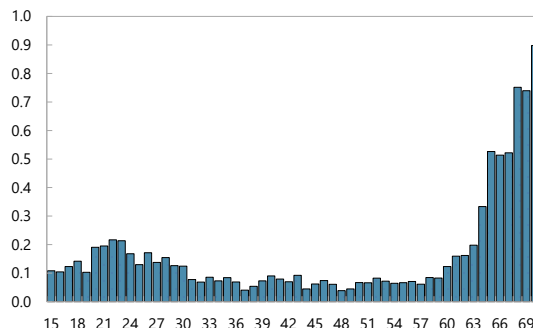


Source: Austria LFS survey.

*...while it remains steady and low for males.*

**Male Part-Time Work by Age, 2019**

(Percent of total male workers)

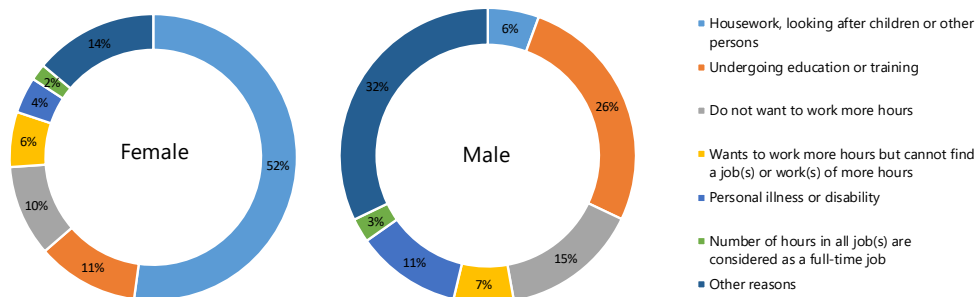


Source: Austria LFS survey.

*Child and elderly care are the main reasons for women to work less than 30 hours.*

**Reason for Working Less than 30 Hours**

(Percent of female or male respondent, 2019)

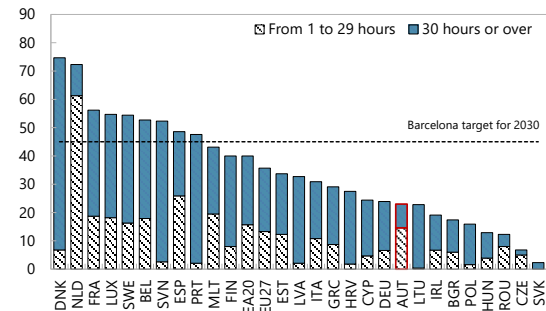


Source: Austria Statistics on Income and Living Conditions Survey.

*Children in Austria tend to attend childcare less frequently than in other European countries and for fewer hours...*

**Children Under Three Years of Age Cared for by Formal Arrangements by Weekly Time Spent in Care**

(Percent of children under three years, 2022)

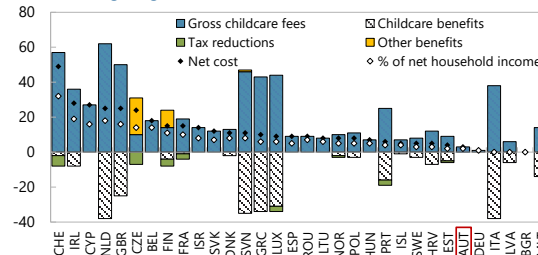


Source: Eurostat.

*...which seems to reflect limited childcare availability and social preferences rather than high childcare costs.*

**Components of Net Childcare Costs, Couple Families**

(Percent of average wage, 2022)



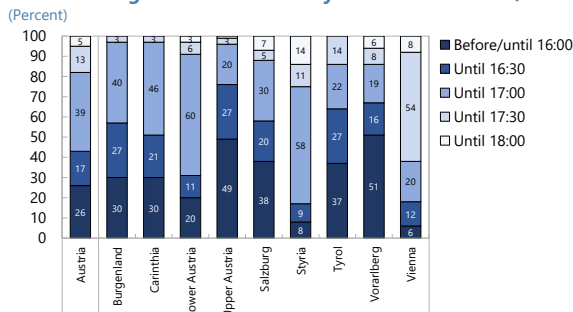
Source: OECD.

Notes: Net childcare cost are equal to gross fees less childcare benefits/rebates and tax deductions, plus any resulting changes in other benefits following the use of childcare. Calculations are for full-time care in a typical childcare centre for a two-child family, where both parents are in full-time employment earning the average wage (AW) and the children are aged two and three.

**Figure 4. Austria: Reason Women Working Part-time: Childcare and Elderly Care (concluded)**

Primary and secondary school closing time varies across regions...

**Latest Closing Time for Schools by Federal State 2019/2020**

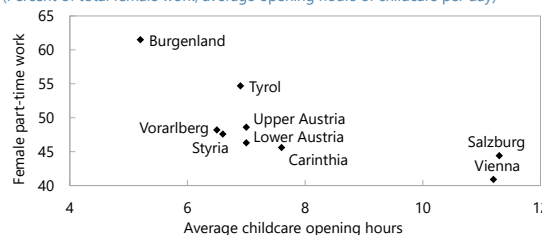


Source: BMBWF National Education Report Austria 2021. Notes: The survey population consists of 2,491 all-day schools (out of 2,499) at the primary level and lower secondary level as well as polytechnic schools.

...as well as daycare opening hours, impacting female capacity to hold a full-time job.

**Female Part-time Work and Childcare Opening, Per Region 2010 1/ and 2022**

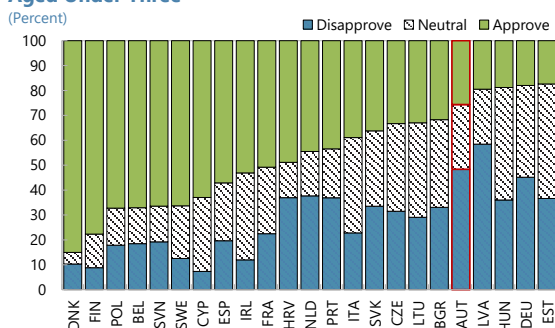
(Percent of total female work; average opening hours of childcare per day)



1/ Comprehensive data on childcare opening hours is not available after 2010; however, evidence suggest some improvement in certain regions, for instance Burgenland, since 2010. Sources: Austria Statistics on Income and Living Conditions Survey; 2010 Kosten der Kinderbetreuung.

Social disapproval for mothers working in Austria is high...

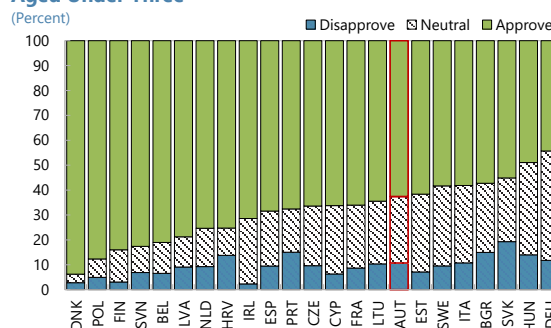
**(Dis)approval of Woman Has Full-time Job While Children Aged Under Three**



Sources: European Social Survey 2018/19 and IMF staff calculations.

...and above male disapproval.

**(Dis)approval of Man Has Full-time Job While Children Aged Under Three**



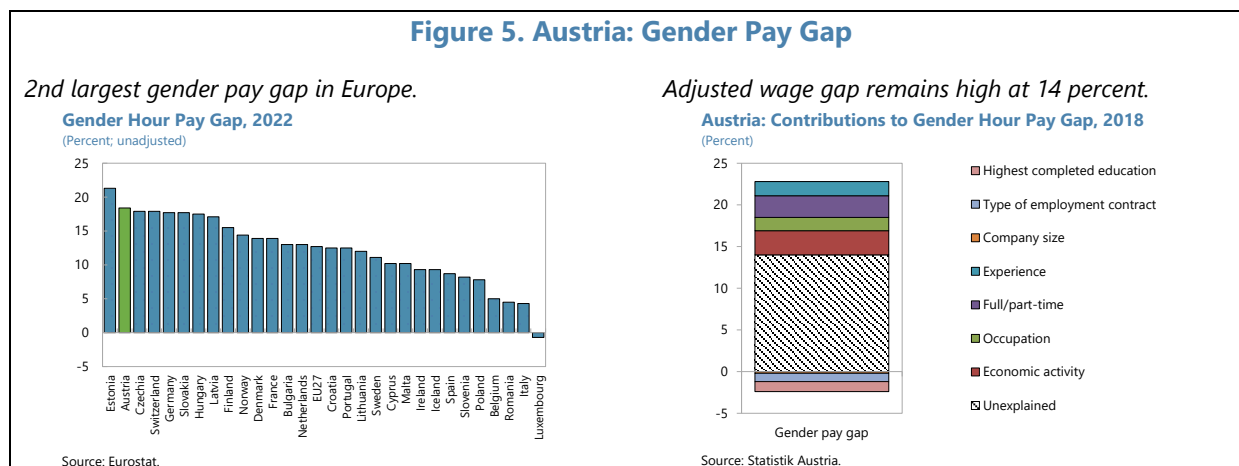
Sources: European Social Survey 2018/19 and IMF staff calculations.

**8. The fact that females often earn less than males may also have created disincentives for females to work full-time** (Figure 5). In 2022, the gender pay gap in Austria reached 18.4 percent (EU-27: 12.7 percent), the second largest in Europe. In Austria, approximately one-third of the gender pay gap is attributable to gender-specific labor market variances, including (i) the tendency of females to engage in lower-paid service roles and sectors with diminished earning prospects, in contrast to men who predominantly occupy higher-paying technical and managerial positions; (ii) high engagement in part-time work, which generally yields lower hourly wages, disproportionately impacting women; and (iii) shorter average tenures at a single employer compared to that of males. Gaps in salaries that cannot be explained by observable individual and job characteristics (the so-called “unexplained” wage gap) reach 14 percent.<sup>7</sup> Given that females’ educational achievement is higher than males’ achievement,<sup>8</sup> females could earn more than males,

<sup>7</sup> The “unexplained” wage gap is calculated based on the Oaxaca-Blinder decomposition; this estimate is in line with [Statistik Austria estimates](#).

<sup>8</sup> Based on [Statistik Austria](#), 21.2 percent of women between 25 and 64 years old had an academy or university degree in 2020, compared to only 17.1 percent of men.

*ceteris paribus*. Moreover, the gender wage gap and gender disparities in labor force participation result in significantly lower old-age pensions for females compared to males. As of 2022, the gender pension gap stood at 41.1 percent in Austria.



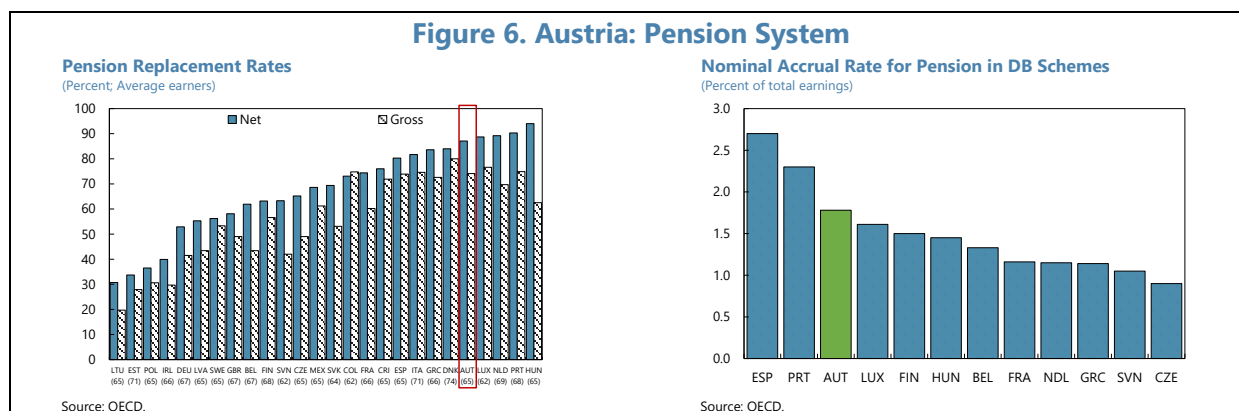
### Subdued Elderly Participation

**9. Austria’s pension system is relatively generous compared to other European countries.**

Both accrual rates and replacement rates rank near the top of the European distribution. Austria has the highest effective annual accrual rate in Europe (1.72 percent). The nominal legal accrual rate is 1.78 percent. The ceiling accrual rate on average earnings is 1.55 times average earnings.

**10. Reforms have adjusted retirement- and pension-related settings to boost labor supply.**

The standard pension age for women is increasing incrementally from 60 to 65 from 2024 to 2033 to match men’s standard pension age. Penalties for early retirement have been reintroduced, and the social insurance old-age pension is to be reduced by 4.2 percent for each year it is claimed before age 65.<sup>9</sup> In parallel, an early starter bonus was introduced, corresponding to a monthly supplement paid to old-age pensioners who have at least 300 months of paid contributions, including at least 12 months of paid contributions before age 20.



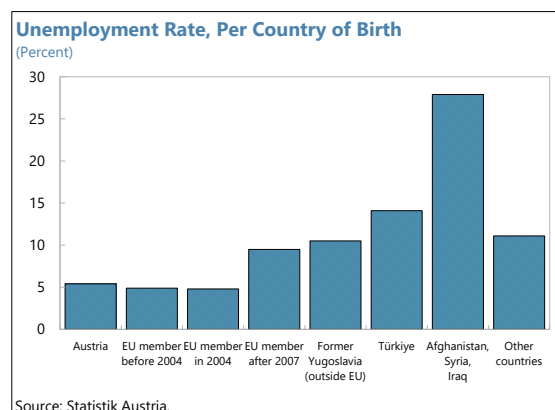
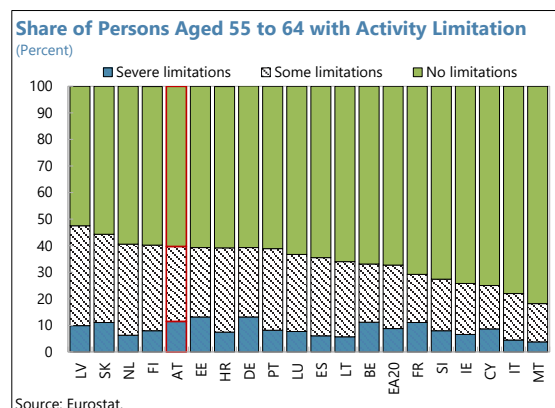
<sup>9</sup> This provision will apply only to men until the completion of the gradual increase in women’s standard pension retirement age in 2033.

**11. Health issues among the elderly limit their participation in the labor force.** Despite the general health status of the population surpassing that of other European countries, the share of individuals aged 55–64 with disabilities exceeds that of peers.

### Integration of Migrants

**12. Immigrants constitute a significant yet underutilized component of the labor market.**

Roughly 20 percent of Austria's population was born abroad, with an average age of 36 years—notably younger than the native population's average of 45 years. This demographic advantage, however, is not fully reflected in the labor market outcomes. In 2022, the employment rate for the foreign-born workforce aged 15–64 was at 69 percent, 6 percentage points below the employment rate for Austrian natives. While the unemployment rate among immigrants exceeds that of Austrian natives, with particularly high rates among natives from Afghanistan, Syria, and Iraq, foreign-born persons are less likely to be long-term unemployed than Austrian natives (11.5 percent compared to 19.7 percent in 2022), reflecting their often-insufficient eligibility for unemployment assistance.<sup>10</sup> Nearly 37 percent of individuals with a migrant background were employed in blue-collar jobs, compared to just 18 percent among Austrian natives.



## D. Options to Boost Labor Supply

*This section studies the impacts of potential reforms options that could increase labor supply in Austria. Using an overlapping generations model (described in Appendix 1), the impact of these policies is assessed on long-term real GDP, labor participation (both intensive and extensive margins), productivity, and government revenue.*

**13. The overlapping generations model features heterogenous agents.** Individuals exogenously differ from each other by gender (male and female), age (16 cohorts of 5-year intervals, from 0–4 years old to 80–84 years old) and education achievement (basic, vocational and intermediate, secondary and pre-university, and higher). The model also features two types of households: couples formed by a female and a male who will have children at some point in their lifetime and single households who do not have children. Couples share a single utility function,

<sup>10</sup> Statistical yearbook [Migration and Integration, 2023](#).

maximizing consumption and facing a disutility of work that differs per gender and age. When couples have children, they face an additional disutility if the female works. This cost relates to the difficulty of coordinating multiple household activities, such as home production and rearing children, which is traditionally done by women in Austria. It can also be interpreted as a cost associated with a social norm expressing disapproval for women working if they have young children. In the budget constraint, a cost of childcare is added if the mother works. On the other hand, single households maximize solely the utility of the individual. As a consequence, different type of households will have distinct labor supply choices, human capital accumulation, incomes, and consumption levels.

**14. The model is calibrated using Austria’s micro and macro data.** The overlapping generations model replicates key features of the Austrian economy, such as demographics (age cohort, education, and household type), returns from experience, human capital accumulation, and gender differences in hours worked and labor force participation. A representative firm hires both male and female effective hours of labor and rents capital at rate  $r^*$  to produce the consumption good. The production function is calibrated to replicate the capital share, depreciation rate, TFP growth, and unexplained gender pay gap of the Austrian economy. The government collects taxes on labor income (labor income tax and social security contributions), consumption (VAT), firms’ revenues, and savings interest and spends on goods, childcare subsidies, and pension benefits. The pension system corresponds to a simplified version of the Austrian defined benefits system. Pension payments correspond to the nominal accrual rate (1.78 percent) times the number of years worked times the average wage over the lifetime. The retirement age is exogenously imposed.

**15. Six policy scenarios are evaluated against Austria’s baseline in 2050.** These include: (i) the impact of increasing childcare availability; (ii) reduction in the “unexplained” wage gap between females and males; (iii) reduction in the cost to families of having mothers working outside the home; (iv) combining policies to reduce constraints for women to participate to the labor force; (v) the impact of aligning pension replacement rates to the European average; and (vi) the impact of higher net immigration. To evaluate the long-term impact of these reform scenarios, the 2023 baseline calibrated model is projected to 2050. This projection accounts for anticipated changes in demographics, educational achievements, and the effects of extending the retirement age for women to 65 years.

### ***Scenario 1: Increasing Childcare Availability***

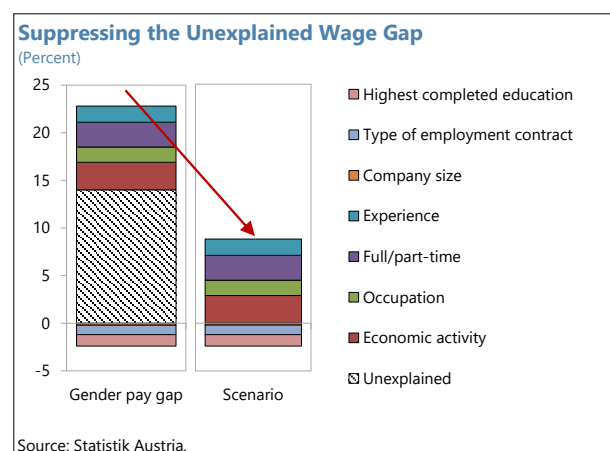
**16. Increasing childcare availability can boost female participation in the labor force.** The first scenario simulates the effects of the government subsidizing half of the childcare cost. While in Austria, childcare costs are minimal for families (see chart in previous section), there is an acute shortage of both childcare facilities and opening hours. This constraint on availability is represented in the model as there being only a single option for families to provide childcare in the absence of



available services: employing a full-time caretaker for their children.<sup>11</sup> A reform that reduces this cost by half generates an increase in female labor force participation (FLFP) by 7 percentage points while the hours of work by men remains nearly unchanged.<sup>12</sup> Effective labor, defined as the number of hours worked times the labor force participation times human capital, increases by 3.1 percent compared to the baseline, which leads to an increase in the level of long-term real GDP by 2.4 percent.<sup>13</sup>

**17. The childcare program incentivizes females to join the labor force and increases government revenues, resulting in a positive fiscal impact.** Government revenues increase due to higher income taxes (+0.6 percent), social security payments collected from women working (on average, +2.2 percent), consumption tax (+2.9 percent), and corporate tax (+2.3 percent) and offset the expected cost of the child-care subsidy program (0.5 percent of GDP). Despite the increase in the number of pensioners benefiting from the generous defined-benefit pension system, the overall net fiscal impact is a positive 0.4 percentage points of GDP.<sup>14</sup> Scenario 2: Reducing the “Unexplained” Gender Pay Gap.

**18. Reducing the gender pay gap can also increase female participation in the labor force.** Practically, this could perhaps be achieved by increasing further wage transparency and undertaking compulsory gender pay audits. If the “unexplained” wage gap of 14 percent in the labor market is removed, the model predicts that FLFP will increase by 12 percentage points, as both higher and lower skilled females increase their supply of labor in response to more attractive wages. The inclusion of more females in the



<sup>11</sup> The cost of a full-time childcare giver is estimated at an annual €12,000 per child, corresponding to the gross wage (€21,600) plus the payroll cost (€4,553) minus the childcare allowance (€2,300). We assume that, on average, a full-time childcare giver takes care of two children.

<sup>12</sup> The literature suggests that reduced out-of-pocket costs for early care and education (ECE) and increased availability of public ECE has positive effects on mothers’ labor force participation and work hours. For example, Mahringer and Zulehner (2015) estimate that a one-euro per hour reduction in childcare costs would increase the employment rate by 8 percentage points in Austria. However, results are not uniform. [Kleven et al. \(2022\)](#) find that publicly provided and subsidized childcare has had no effect on the secular decline in gender inequality in Austria. They infer that cheap available care by relatives and strong preferences for maternal care are the main reasons why the large expansion of childcare provision in Austria has had no effect on female labor market outcomes.

<sup>13</sup> Scenario 1 incorporates only the direct effects of decreased costs of childcare and does not incorporate all possible second-round effects, such as potential changes in social norms and reduced gender discrimination as more women join the workforce, which may in turn further increase female labor force participation. For this reason, the positive effects on GDP could be higher than estimated in this scenario.

<sup>14</sup> Fiscal impact estimates in this chapter assume that all government spending, except for pension and childcare costs, remains equal to the nominal value in the baseline scenario.

labor force lifts households and single females' incomes, boosting demand for consumption of goods. Firms hire more employees and, in equilibrium, effective labor increases by 18.3 percent.<sup>15</sup>

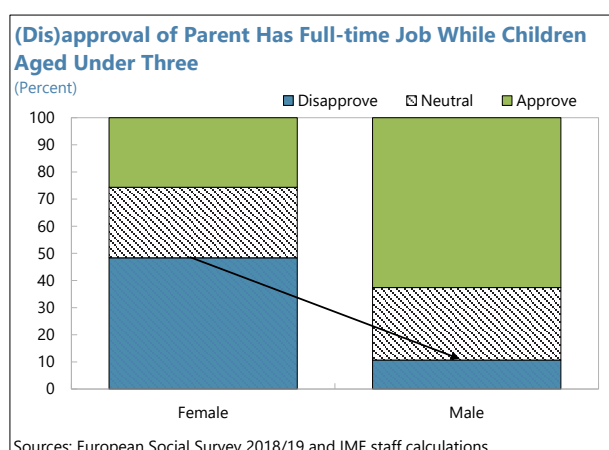
**19. Reducing the “unexplained” wage gap also boosts the size of the economy and government tax collections.** Higher wages incentivize females to join the labor force, increasing output; the level of real GDP is higher by 14 percent compared to the baseline. The fiscal balance improves by 5.1 percentage points of GDP due to the higher collections of consumption taxes, labor taxes, and corporate taxes (given the boost in production).

### **Scenario 3: Reducing the Social Disapproval of Female Work**

**20. Lowering the costs for females to join the labor force can also enhance long-term growth.** As noted in the previous section, 52 percent of Austrian women working part-time did not look for a full-time job because of housework and the need to look after children or other persons.

Additionally, the disapproval of women with children under the age of three to work is close to 50 percent. This feature of Austrian society is captured in the model by differentiating labor disutility between females and males, as well as by adding a cost in the family's utility function when a female works when she has children. Practically, national education campaigns that limit gender bias and encourage women who wish to pursue careers outside the home can over time reduce the cost and stigma for women who wish to work. Such policy impacts are

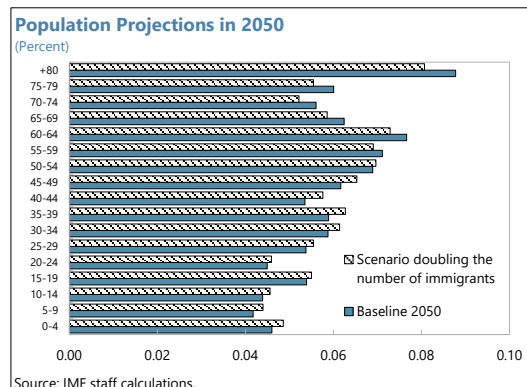
captured in the model as an equalization of labor disutility costs between males and females and the suppression of the additional disutility of mothers working. This reform particularly encourages highly educated women to join the labor force, as their absolute returns from work are larger. The reform also induces investment in human capital, which in turn boosts workers' productivity, leading to higher salaries. This translates into an increase in FLFP by 15.5 percentage points, boosting effective labor by 14 percent and real GDP level by 10.4 percent. The net fiscal impact is positive, with the fiscal balance increasing by 3.2 percentage points of GDP compared to the baseline.



### **Scenario 4: Reducing Constraints to Greater Female Labor Force Participation**

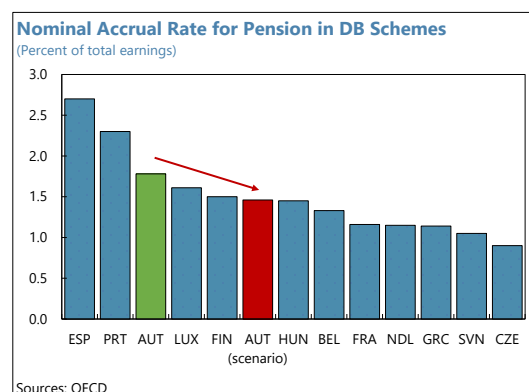
<sup>15</sup> Scenario 2 could be interpreted as an upper limit of the projected benefits from narrowing the gender pay gap, as the scenario assumes that reducing the gap leads to a corresponding increase in female workers' productivity within the model. However, the situation is more nuanced. The reduction of the gender pay gap is indeed expected to foster productivity growth, as it encourages the participation of highly skilled women in the workforce, prompts greater investment in human capital due to the anticipation of higher returns, and reduces career interruptions, thereby lessening the loss of human capital. Nonetheless, a portion of the reduction in gender pay gap could also lead to a redistribution of rents without enhancing productivity.

**21. Reducing constraints to greater female labor force participation could increase real GDP by 15 percent over time.** Combining policies related to childcare availability, reducing the unexplained gender wage gap, and reducing social disapproval of female work (Scenarios 1, 2, and 3) would translate into an increase in FLFP by 15.9 percentage points, increasing effective labor by about 20 percent. In this scenario, real GDP level would be 15.4 percent higher than the baseline scenario.<sup>16</sup> The net fiscal impact would also be positive, with the fiscal balance increasing by 5.5 percentage points of GDP compared to the baseline.



**Scenario 5: Lowering Pensions' Replacement Rate to the EU27 Average**

**22. Lowering the pension replacement rate to the EU27 average would boost effective hours worked and improve the fiscal balance.** A lower pension replacement rate increases the incentive for individuals to build more savings for retirement, thereby enhancing incentives for labor force participation. Female labor force participation increases by 1.5 percentage point, as females previously outside the labor force have higher marginal utility from wages.<sup>17</sup> Effective labor increases by 0.5 percent, leading to an increase in real GDP by 0.4 percent compared to the baseline level. Pensions expenditures decrease 15.3 percent, contributing to an improvement of the fiscal balance of 2 percentage points of GDP.



**Scenario 6: Increasing Net Immigration**

**23. Higher net immigration mechanically lowers demographic headwinds, increasing medium-term growth and improving fiscal balances.** This scenario posits that the flow of the migrant population between 2019 and 2050 is twice as large as in the baseline scenario and that migrants are generally younger than the native population but have a similar education distribution. This boosts the labor force (assuming no migrant discrimination within the model) and increases effective hours worked by 3 percent compared to the baseline, improving the real GDP level by 3.3 percent. The impact on fiscal balances is also positive as it improves by 2.0 percentage point of GDP.

<sup>16</sup> As noted in footnote 16, Scenario 2 is in some ways an upper-bound estimate of the effect of eliminating the gender pay gap. Since Scenario 2 already has large effects on boosting female labor force participation and GDP, the scope for further increases by adding reforms in Scenarios 1 and 3 is modest.

<sup>17</sup> The effect on male labor supply is modest, as male labor supply during prime working years is already substantial.

## E. Conclusion

**24. Closing gaps in elderly participation rates and in average hours worked, particularly for women, would impart a sizable boost to potential growth.** Moving the labor market parameters where Austria lags up to the median in Europe could add roughly 10 percent to hours worked relative to current levels, which would be a sizable boost to the level of GDP. There are several policy options to achieve this objective:

- A key step would be to address low rates of full-time female work, including by expanding childcare availability in terms of facilities, staffing, and quality, especially in other regions outside Vienna and Salzburg, given the strong correlation between childcare provision and female part-time work across Austrian regions. Increasing availability of elderly care could also support female full-time work. Monitoring wage transparency and performing discrimination testing could help close gender pay gaps, which would also help to encourage greater female participation. Providing young women with more information about the costs associated with leaving the workforce could enhance their decision-making.
- Among elderly workers, Austria has recently taken steps to increase the female retirement age and remove incentives for early retirement, which are welcome. However, further efforts may be needed, including additional reforms to the pension system to ensure its sustainability, which may also encourage greater elderly participation in the labor force. Improving the health of elderly workers could also increase their participation in the labor force.
- Finally, better integration of migrants could improve their labor force prospects. Despite the significant efforts to increase the provision of language and literacy courses, expanding labor-market opportunities and improving professional recognition of migrants' credentials would also help increase labor supply.

## References

- Blinder, A. S., 1973. "Wage Discrimination: Reduced Form and Structural Estimates". *Journal of Human Resources*. 8 (4): 436–455.
- Chade, H., and G. Ventura, 2002. "Taxes and Marriage: A Two-Sided Search Analysis." *International Economic Review* Vol. 43.3 pp: 955–985.
- Fabrizio, S., A. Fruttero, D. Gurara, L. Kolovich, V. Malta, M. Tavares, and N. Tchelishvili, 2020. "Women in the Labor Force: The Role of Fiscal Policies." International Monetary Fund, Washington, DC.
- Guner, N., R. Kaygusuz, and G. Ventura., 2011. "Taxation and Household Labour Supply". *The Review of Economic Studies* 79, No. 3, pp: 1113–1149.
- Guner, N., R. Kaygusuz, and G. Ventura., 2020. "Child-related Transfers, Household Labour Supply, and Welfare." *The Review of Economic Studies*, 87(5), 2290–2321.
- Kleven H., C. Landais, J. Posch, A. Steinhauer, and, J. Zweimüller, 2022. "Do Family Policies Reduce Gender Inequality? Evidence from 60 Years of Policy Experimentation." NBER Working Paper 28082.
- Mahringer, H., and C. Zulehner. 2015. Child-care Costs and Mothers' Employment Rates: an Empirical Analysis for Austria. *Review of Economics of the Household*, 13, 837–870.
- Malta, V., A. Martínez Leyva, and M. Tavares, 2019. "A Quantitative Analysis of Female Employment in Senegal." International Monetary Fund, Working Paper 19/241, Washington, DC.
- Malta, V., and M. Pinat, 2024 (forthcoming). "An OLG Model to Analyze Gender Gaps in Advanced Economies: The Case of Austria." International Monetary Fund, Working Paper, Washington, DC.
- Mincer, J., and S. Polachek, 1974. "Family Investments in Human Capital: Earnings of Women." *Journal of Political Economy* 82, no. 2, Part 2 pp: S76–S108.
- Oaxaca, R., 1973. "Male-Female Wage Differentials in Urban Labor Markets". *International Economic Review*. 14 (3): 693–709. doi:10.2307/2525981. JSTOR 2525981.
- Statistical Yearbook, 2023. [Migration and Integration](#).

## Appendix I. Overlapping Generations Model

### 1. In this appendix, we summarize the overlapping generations model used in Section D.

For a full description of the theoretical model please refer to Malta and Pinat (2024).<sup>1</sup> In this framework, heterogenous agents live in a small open economy for  $J$  periods and die at the end of period  $J$ . Individuals exogenously differ from each other by generation, gender, education, and type of household. Throughout working life, workers' human capital change depending on whether he (she) has worked in the previous period. Males and females retire through the public pensions system at ages  $J^{Rm}$  and  $J^{Rf}$ , respectively.<sup>2</sup>

### Households Preferences

2. **There are two types of households.** A family household is comprised by a male and a female and, during certain periods, children. Husband and wife belong to the same generation but do not necessarily have the same education level. A single household is composed either by a single male or female, that do not have child.

#### Household Type 1: Family

Family households maximize utility over the  $J$  periods of life and discount the future at rate  $\beta$ . We assume that, for each period  $t$ , households have log preferences over consumption of goods and disutility over male and female labor:

$$u(c_t(\varepsilon), l_t^f(\varepsilon), l_t^m(\varepsilon)) = \log(c_t(\varepsilon)) - \psi_t^m (l_t^m(\varepsilon))^\chi - \psi_t^f (l_t^f(\varepsilon))^\chi - q_t(\varepsilon) \mathbb{1}_{l_t^f > 1}$$

where  $\varepsilon = \{\varepsilon^f, \varepsilon^m\}$  is the initial endowment of the couple (female and male education, which is exogenously distributed<sup>3</sup>);  $c_t(\cdot)$  is the consumption of the single good in the economy;  $\psi_t^f$ ,  $\psi_t^m$  and  $q_t$  are parameters for the disutility of work, and  $\chi$  is the intertemporal elasticity of labor supply.<sup>4</sup>

#### Household Type 2: Singles

Single households maximize utility over the  $J$  periods of life and discount the future at rate  $\beta$ . We assume that, for each period  $t$ , singles have log preferences over consumption of goods and disutility over labor:

<sup>1</sup> The model in Malta and Pinat (2014) is based on Malta, Martínez Leyva, and Taveres (2019), Guner et al (2020) and and Fabrizio et al. (2020). It refers to the macro literature that studies the impact of government policies on female labor force participation in a micro-founded framework featuring life-cycle dynamics and agents' heterogeneity, such as Chade and Ventura (2002) and Guner, Kaygusuz, and Ventura (2011).

<sup>2</sup> We assume  $J^{Rm} \geq J^{Rf}$ , i.e, males retire at the same time or later than females. See Appendix 2 for more details on calibration.

<sup>3</sup> Using microdata on couple's education for the specific country under study.

<sup>4</sup> We use  $\psi_t^m$  different than  $\psi_t^f$  so as to match different male vs female hours worked.

$$\text{Female single household: } u(c_t(\varepsilon), l_t^f(\varepsilon^f)) = \log(c_t(\varepsilon)) - \psi_t^m(l_t^m(\varepsilon))^x$$

$$\text{Male single household: } u(c_t(\varepsilon), l_t^m(\varepsilon^m)) = \log(c_t(\varepsilon)) - \psi_t^m(l_t^m(\varepsilon))^x$$

## Firms

**3. Goods are produced by a representative firm using effective labor supplied by individuals and capital in a Cobb-Douglas production function.** The formal goods production function is given by:

$$Y_t = AK_t^{\alpha_K}(L_t^m + \phi_t L_t^f)^{1-\alpha}$$

where  $A$  is total factor productivity,  $L^m$  is the total effective male labor hired;  $L^f$  is the total effective female labor hired;  $\phi_t$  is the parameter between 0 and 1 capturing the discrimination against females that reduces their labor efficiency and wages;  $\alpha_K$  is the factor share; and  $K$  is the stock of capital.

## Human Capital

**4. Males and females have exogenous education levels.** Human capital is a function of education level and work experience. In period 1, an agent's human capital is given by his/her education:  $h_1^g = e^g$ , where gender  $g \in \{f, m\}$ . In the following periods and until retirement, human capital accumulation for males grows at an exogenous rate  $\theta_t^m(e)$ , while for female human capital grows if she participates in the labor force (at exogenous rate  $\theta_t^f(e)$ ) and depreciates at rate  $\delta^f$  if she does not work. This means that women and men can have different returns to experience, which is one source of gender gaps in the labor market.

Therefore, for  $t \in \{2, \dots, J^R\}$ :

$$h_t^m(\varepsilon^m) = (1 + g_t^m(\varepsilon^m))h_{t-1}^m(\varepsilon^m)$$

$$h_t^f(\varepsilon^f, l_{t-1}^i) = (1 + \check{g}_t^f(\varepsilon^f, l_{t-1}^i))h_{t-1}^f(\varepsilon^f)$$

where  $\check{g}_t^f(\varepsilon^f, l_{t-1}^i)$  is a discontinuous function

$$\check{g}_t^f(\varepsilon^f, l_{t-1}^i) = \begin{cases} g^f(\varepsilon^f) & \text{if } l_{t-1}^i > 0 \\ \delta^f & \text{if } l_{t-1}^i = 0 \end{cases}$$

## Optimization Problems

### 5. The optimization problems are the following:

*Households Type 1 Problem:* A couple with education  $e = \{e^m, e^f\}$  (suppressed here for simplicity) chooses consumption, labor supply and savings to maximize life-time utility subjected to a budget constraint:

$$\max_{\{c_t, l_t^f, l_t^m, a_t\}} \sum_{t=1}^J \beta^{t-1} \log(c_t) - \sum_{t=1}^{J^{Rm}-1} \beta^{t-1} \psi_t^m (l_t^m)^\chi - \sum_{t=1}^{J^{Rf}-1} \beta^{t-1} [\psi_t^f (l_t^f)^\chi + q_t \mathbb{1}_{l_t^f > 0}]$$

s.t.

$$(1 + \tau^c)c_t + (\kappa_t - g^{\kappa_t}) \mathbb{1}_{l_t^f > 0} \leq w_t^m l_t^m h_t^m (1 - \tau^L(\cdot) - \tau^{SS1}) + w_t^f l_t^f h_t^f (1 - \tau^L(\cdot) - \tau^{SS1}) + p_t^m(\cdot) + p_t^f(\cdot) + [a_{t-1}(1 + r_t^*(1 - \tau^a)) - a_t] + g_t^{ct}$$

where

$$l_t^g \in [0,1], p_t^g(\cdot) = 0 \text{ if } t < J^{Rg}, p_t^g(\cdot) = \min \left\{ p_{min}, \sum_{j=1}^{J^{Rg}-1} \rho w_j^g l_j^g h_j^g \right\} \text{ if } t \geq J^{Rg}, g \in \{f, m\}$$

$$a_0 = a_J = 0$$

The left-hand side of the budget constraint represents the costs of the household on consumption ( $\tau^c$  is the VAT rate) and on childcare ( $\kappa_t$  minus the government's subsidy to childcare, denoted by  $g^{\kappa_t}$ ). Childcare is only paid if the mother decides to participate in the labor market while the child is young.

The right-hand side of the budget constraint shows the sources of income – including labor income, pensions ( $p_t^g$ ), and income from savings ( $a_{t-1}$ ). Individuals are subjected to government taxes:  $\tau^c$  is a tax on consumption goods,  $\tau^L(\cdot)$  is a labor income tax function that depends on individuals' wages,  $\tau^{SS1}$  is the social security contribution paid by the employee. Pensions benefits are at least  $p_{min}$ . Parameter  $\rho$  is the accrual rate of the pensions benefit.

*Households Type 2 Problem:* A single household of gender  $g$  and education  $e$  chooses consumption, labor supply and savings to maximize life-time utility subjected to a budget constraint. The optimization problem is similar to the one above:

$$\max_{\{c_t, l_t^g, a_t\}} \sum_{t=1}^J \beta^{t-1} \log(c_t) - \sum_{t=1}^{J^{Rg}-1} \beta^{t-1} \psi_t^g (l_t^g)^\chi$$

s.t.



$$(1 + \tau^c)c_t \leq w_t^g l_t^g h_t^g (1 - \tau^L(\cdot) - \tau^{SS_1}) + p_t^g(\cdot) + [a_{t-1}(1 + r_t^*(1 - \tau^a)) - a_t]$$

*Firm's Problem:* A representative firm hires both male and female effective hours of labor,  $L^m$  and  $L^f$  and use capital  $K$  to produce the only consumption good in the economy. It pays taxes on revenues and social contributions for its workers. The firm's profit maximization problem is given by:

$$\max_{\{L^f, L^m, K\}} (1 - \tau^v)AK^{\alpha_K}(L^m + \phi_t L^f)^{1-\alpha_K} - (1 + \tau^{SS_2})(w^m L^m + w^f L^f) - (r^* + \delta)K$$

where  $\delta^K$  is the depreciation rate of capital,  $r^*$  is interest rate (internationally set, as this is a small open economy).

### Government Budget Constraint

**6. The government taxes consumption, labor income, savings remuneration, and firms' revenues and spends money on childcare subsidies, consumption goods, and pensions.** Let  $R_t^C$  be the government revenues with consumption tax  $\tau^c$ ;  $R_t^L$  the government's collections from labor income tax  $\tau^L$ ;  $R_t^a$  the government's revenues with assets (savings/capital) remunerations from tax  $\tau^a$ ;  $R_t^v$  the government collection on firms' revenues with tax rate  $\tau^v$ ;  $R_t^P$  the government collection from pensions contributions from employees ( $\tau^{SS_1}$ ) and employers ( $\tau^{SS_2}$ ).

At any period  $t$ , the government spends its revenues on childcare subsidies ( $G_t^K$ ), on consumption goods ( $G_t^C$ ), and on pensions ( $G_t^P$ ). The government has access to external financial markets and can borrow externally or domestically to satisfy its expenditure, accumulating debt  $D$ . The government's budget constraint at every period is therefore:

$$D_{t+1} = (1 + r^*)D_t + G_t^K + G_t^C + G_t^P - R_t^P - R_t^C - R_t^L - R_t^a - R_t^v$$

## Appendix II. Calibration

### 1. The model is calibrated using both exogenous and endogenous parameters.

#### *Exogenous Parameters*

### 2. Parameters calibrated exogenously include the following:

- Age structure. Austria's age distribution is used to calculate the weight of each generation  $j \in \{1, 2, \dots, J\}$  of the model.
- Education ( $e$ ). Education achievements are grouped into 4 education categories: Basic Education; Vocational and Intermediate Education; Secondary Education and Pre-University Training; Higher Education. Austrian statistics on income and living conditions (EU-SILC) is used to calculate the distribution of education by couples and by singles.
- Returns from experience ( $\theta_t^m$  and  $\theta_t^f$ ). Males and females return from experience are estimated using Mincer regressions based on EU-SILC.
- Discrimination parameter  $\phi_t$ . Initial "unexplained" gender gap is estimated through an Oaxaca-Blinder decomposition of wages for young people. Gender pay gaps evolve throughout time due to gender differences in returns from experience, as found in the data.

The full list of exogenous parameters is shown in Table 1.

#### *Endogenous Parameters*

### 3. The endogenous parameters are the disutility of labor:

- The female disutility of labor  $\psi_j^f$  is calibrated to match the average hours worked by female in Austria. It is period-invariant,  $\psi_j^f = \psi^f$
- The male disutility of labor  $\psi_t^m$  is calibrated to match a male's hours worked by age group.
- $q_t(e^f)$  is calibrated to match female labor force participation by age group.

The full list of endogenous parameters is shown in Table 2.

Table 1. Austria: List of Exogenous Parameters

Parameter	Description	Value
$J$	Number of periods	13 (meaning each generation has 5 years, adults going from 20 until 84)
$J^{Rm}$	Retirement age for men	10 (at age 65)
$J^{Rf}$	Retirement age for women	9 or 10 (at age 60 or 65)
$\kappa_t$	Childcare cost	€48,500 per child
$\phi_t$	Unexplained gender gap	1 - 0.0985
$e$	Education levels	4 different types, using household survey data
$\theta_t^m$ and $\theta_t^f$	Returns from experience	Two 4x8 tables calculated using Mincer regressions <sup>1</sup>
$\delta^f$	Depreciation of female human capital	0.0420, 0.0363, 0.0307, 0.0250 – respectively for education types 1 to 4
$\beta$	Agents' discount rate	0.94 for one year
$\chi$	Intertemporal elasticity of substitution (of labor)	3.5
$\mu_1$	Share of households type 1	0.60
$\mu_2$	Share of households type 2	0.40 (0.20 males, 0.20 females)
$r^*$	Interest rate	4 percent per year
$\alpha_K$	Capital share	0.353
$\delta^K$	Depreciation rate of capital	5 percent per year
$\dot{A}$	TFP growth rate	0.3 per year
$\tau^c$	Consumption tax rate (VAT)	0.20
$\tau^L(x)$	Income tax rate function	$\tau^L(x) = -0.0237x^2 + 0.1923x - 0.0451$ , where x is equal to income divided by average income of the full-time male worker with basic education (equal to €24,820 per year, using household survey data)
$\tau^a$	Tax rate on savings' returns	0.275
$\tau^v$	Corporate tax rates	2.76 percent of firms' revenues
$\tau^{SS_1}$	Social security contribution paid by the employee	0.1812 (0.1025 is for pensions only)
$\tau^{SS_2}$	Social security contribution paid by the employer	0.2103 (0.1255 is for pensions only)
$p_{min}$	Minimum pensions	€967 per month for household type 2 and €1472 for household type 1
$\rho$	Pensions accrual rate	1.78 percent per year

<sup>1</sup> The dimension of the matrix corresponds to the 4 types of education and the 8 different returns from experience gained from period 2 until period 10.

Table 2. Austria: List of Endogenous Parameters

Parameter	Parameter Description	Parameter Value	Matching Statistic	Value in the data	Value found with the model
$\psi^f$	Disutility of labor (females)	0.37	Average female workers hours worked	35.9 hours per week	35.5 hours per week
$\psi_j^m$	Disutility of labor (males), by age group	0.210 0.145 0.145 0.145 0.145 0.145 0.145 0.220 1.61	Average male hours worked <sup>1</sup>	33.0 40.5 40.5 43.6 44.4 47.1 43.6 40.5 22.4 hours per week, by age group (from 20–24 until 60–64)	33.1 40.5 42.1 43.8 44.0 44.0 44.0 40.8 22.3 hours per week, by age group
$q_t(e^f)$	Disutility of female work	Ranging from 0 to 0.30 (depending on education level and age group)	Female labor force participation by age group	0.67 0.86 0.75 0.86 0.88 0.87 0.87 0.74 0.16	0.67 0.89 0.75 0.87 0.89 0.89 0.89 0.70 0.00

<sup>1</sup> This includes zero for males not working.

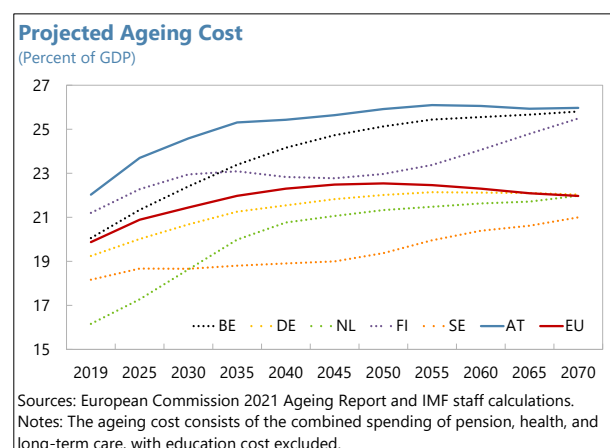
## BUILDING FISCAL ROOM IN AUSTRIA

Fiscal expenditure pressures are projected to increase significantly in Austria over the medium and long term due to pressures from population aging, higher interest payments, planned increases in defense spending, and public investment needed to meet green transition and digitalization goals. This chapter thus explores potential fiscal reform options that can help offset these pressures and create fiscal room for deficit reduction and other fiscal priorities.

### A. Looming Expenditure Pressures

**1. Aging.** Aging-related fiscal costs are expected to increase by around 1.5 percent of GDP between 2019 and 2030 and by a further 1.3 percent of GDP between 2030–2040, reaching one of the highest levels of spending in the euro area.<sup>1</sup> These costs include spending on:

- **Health care:** Public health spending is already among the highest in the OECD.<sup>2</sup> Additional pressures are expected to arise from population aging, the incidence of age-related chronic diseases, and more costly medical technologies and pharmaceuticals. Overall, annual public health care spending is projected to increase by 0.1 percent of GDP by 2030 and by an additional 0.6 percent of GDP by 2040, from an estimated 7.2 percent of GDP in 2023.



- **Long-term care:** Annual long-term care costs are expected to rise by 0.3 percent of GDP by 2030 and by an additional 0.4 percent of GDP by 2040, as the predominance of the model of family care is expected to end and chronic age-related diseases are expected to increase.
- **Pensions:** Annual pension costs are expected to increase by 1.1 percent of GDP in 2030 and by an additional 0.3 percent of GDP by 2040, reaching one of the highest levels among European countries. Public pension spending as a percent of GDP, pension contributions as a percent of GDP, and the average number of years in retirement are among the highest in the OECD.

<sup>1</sup> Based on Ministry of Finance 2022 Long-Term budget projections. Numbers are broadly in line with the [2021 Aging Report](#) of the European Commission. The [October 2022 Fiscal Monitor](#) estimates an increase of pension and health costs of 1.3 and 0.9 percent of GDP, respectively, between 2021–2030.

<sup>2</sup> European Commission's [State of Health in the EU – Austria Country Health profile \(2023\)](#).

- 2. Defense spending.** The authorities have indicated an intention to increase defense spending to 1.5 percent of GDP between 2027 and 2032, up from 0.8 percent of GDP in 2023.<sup>3</sup>
- 3. Interest.** Annual interest payments are expected to increase by 0.5 percent of GDP in 2030 as debt is rolled over at higher interest rates, given the rise in interest rates relative to pre-pandemic levels.
- 4. Need for investment in the green transition.** Austria's greenhouse gas emissions have been reduced at a slower pace than the EU average since 2005. And, while its carbon intensity is lower than the EU average, the country still faces challenges in achieving carbon neutrality. The Commission's staff [working document](#) accompanying the assessment of Austria's Recovery and Resilience Plan (RRP) assesses that, for Austria, the estimated network enhancement investment needs to accommodate the planned expansion of renewable-power generation are €18 billion (3.8 percent of GDP) to meet the target of making the network fit for 100 percent renewable electricity by 2030.<sup>4</sup> This covers generation of renewable energy as well as upgrading the grid infrastructure to handle increased renewable inputs and demand. Based on EIB (2021) collection of NECP cost to transition, total investment needs to achieve net zero emissions by 2050 could perhaps add between 0.5 and 2.5 percent of GDP to the deficit annually,<sup>5</sup> depending on the division of green investment between the public and private sectors.<sup>6,7</sup> Staff estimates that public investment in the green transition reached 0.2 percent of GDP in 2023.
- 5. Need for investment in digitalization.** Austria ranks 10th among the 27 EU Member States in the 2022 edition of the [Digital Economy and Society Index](#) (DESI), ranking above the EU average in all dimensions but connectivity. Nonetheless, large investments are still needed to improve digitalization, in particular to extend fiber connections to rural areas by 2030 and to improve digital services for citizens.<sup>8</sup> While a sizable part of investment will be financed by the Recovery and Resilience Facility (RRF), the [2023 National Strategic Roadmap for the Digital Decade of Austria](#) estimates the cost for the government at EUR 360m (only costed measures).

<sup>3</sup> Following the commitment of NATO countries to increase military spending to 2 percent of GDP after Russia's invasion of Ukraine, Austria, which is not part of NATO, has committed to increase defense spending to 1.5 percent of GDP in 2027 (part of this cost relates to pension payments already accounted for in the pension costs, which is why the additional cost in Table 1 is somewhat lower than the total increase in defense spending).

<sup>4</sup> Estimate from the [Austrian Energy Agency \(2020\)](#). The total cost including adding renewable generation capacity, upgrading heating systems, and enabling electric mobility is estimated at €50 billion (see Chapter 5).

<sup>5</sup> This is in line with Ministry of Environment estimates. Transition to net zero emissions by 2050 could add 0.4 percent of GDP to the deficit annually, based on *October 2023 Fiscal Monitor* estimates for advanced economies.

<sup>6</sup> The lower estimate reflects a public share of 15 percent in the total investment for the green transition (similar to Germany) while the upper estimate corresponds to a share of 60 percent (in line with Austria's recent contribution of the public sector). Higher carbon prices/taxes would increase incentives for private sector investment in the green transition.

<sup>7</sup> The authorities budgeted €14 billion (in cash) for 2024–27 for Climate and Transformation, from which staff estimates €5 billion could correspond to actual investment, or 0.4 percent of GDP per year.

<sup>8</sup> Needs include achieving nationwide gigabit connectivity by 2030. Austria plans to address this challenge through its 2030 Broadband Strategy.

**6. The 2024 budget incorporates some expenditure revisions aimed at addressing some of these areas.** For example, some resources have been allocated for long-term care as a result of the fiscal equalization exercise.<sup>9</sup>

**7. Nonetheless, the spending pressures discussed above are expected to be sizable over the medium and long run** (Table 1).

Given these pressures, the following sections explore possible options for generating fiscal room to offset these pressures, reduce the deficit, and/or fund priority spending or growth-enhancing tax reforms.

**Table 1. Austria: Additional Expected Annual Expenditure**  
(In percentage points of GDP, compared to 2023)

	2030	2040
Aging 1/	1.5	2.8
Health care	0.1	0.7
LT health	0.3	0.7
Pension	1.1	1.4
Climate 2/	0.5-2.5	0.5-2.5
Defense	0.2	0.2
Interest payments	0.5	0.5
Digitalization	0.1	...
<b>Total</b>	<b>2.7-4.7</b>	<b>4.0-6.0</b>

1/ Aging costs are based on Long-term Budget Projection 2022 by the Ministry of Finance. Data are extrapolated for 2023.

2/ Investment needs for the green transition are based on EIB (2021) and different assumptions on the public contribution, as detailed in the text.

## B. Options for Generating Fiscal Room

**8. Reviewing subsidies and tax expenditures.** In 2022, subsidies provided by the general government represented 2.7 percent of GDP, exceeding the EU average by 0.5 percentage points. This elevated level is primarily attributable to remaining COVID-19 related measures and Austria's robust transparency in subsidy reporting, but it also reflects some environmentally harmful subsidies (including tax expenditures). [WIFO](#) estimates that climate counterproductive subsidies in Austria, mainly in the transportation sector (61 percent, including diesel fuel tax concessions and direct subsidies for purchasing new petrol or diesel vehicles) and energy production (38 percent, including subsidies for coal, oil, and natural gas production and tax exemptions for energy-intensive industries) range annually between €4.1–5.7 billion. These subsidies are fiscally costly, distort market prices, and reduce incentives for eco-friendly transport and efficient energy use.

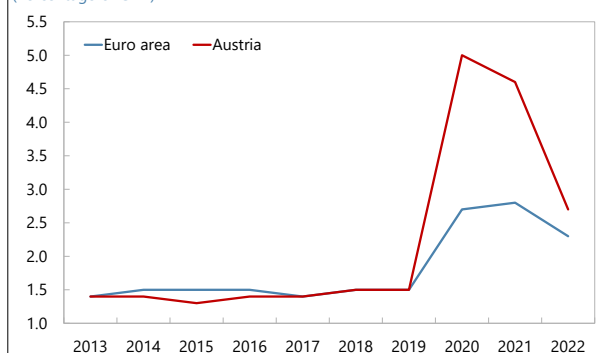
**Table 2. Austria: Environmentally Harmful Subsidies**  
(Annual cost in millions of euros)

	Estimated cost
Mineral oil tax advantage for diesel	540-1100
Commuter allowance	510
Tax exemption for commercial aviation fuel	408
VAT exemption for international and reduction for domestic flights	227-426
Mandatory construction of parking spaces	162-937
Tax exemption for inland waterway transport	22
Pre-tax deduction of commercial trucks	n.c.
Special depreciation rate for business cars	n.c.

Source: WIFO (2022).

Notes: n.c. for not costed.

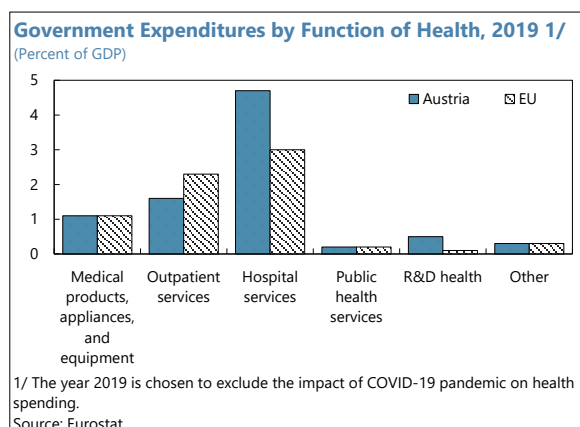
**General Government Subsidies**  
(Percentage of GDP)



Source: Eurostat.

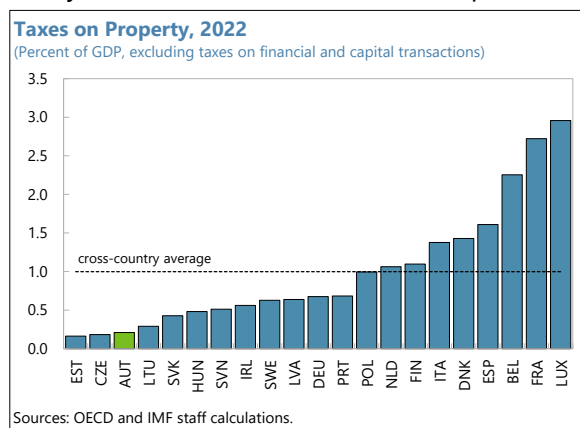
<sup>9</sup> See the fiscal policy section of the accompanying Staff Report for the 2024 Article IV Consultation for further discussion of such measures.

**9. Achieving efficiencies in healthcare spending.** Austria ranked among the top three spenders in healthcare among EU countries in 2019. This high level of expenditure was driven largely by significant investments in hospital and public health services, contrasting with relatively lower spending on outpatient services. Ongoing efforts to enhance use of outpatient and primary healthcare could help improve spending efficiency over time. Bringing down government health expenditures to the EU average could yield up to 1 percentage point of GDP in savings.



**10. Pension reform.** The authorities and European Commission estimate that increasing the retirement age in line with  $\frac{3}{4}$  of the change in life expectancy at current retirement ages would lower pension expenditure by 0.3 percentage points of GDP in 2030 and by 0.5 percentage points of GDP in 2040, up to a gain of 1.5 pp of GDP in 2070.<sup>10</sup> Staff estimate that lowering the pension replacement rate to the EU27 average (with changes to the accrual rate applied to new contributions starting in 2025) would decrease pension expenditure by around 0.1 percentage points of GDP in 2030 and 0.9 percentage points of GDP in 2040 and could yield net fiscal savings of about 2 percentage points of GDP by 2050 (Chapter 2).

**11. Increase property tax.** Property tax is currently based on the *Einheitswert*, the standard ratable value of immovable property, which is substantially below market values. More frequent updates to its valuation (the last comprehensive update of property values based on actual market prices was in 1973) and shifting the tax base to 75 percent of the market value could substantially increase revenue and better align Austria with international standards. Increasing property tax revenue to the OECD average as a percent of GDP would boost revenue by about 0.8 percentage point of GDP annually. There is also room to improve the tax design, reduce its complexity, and improve its transparency.



**12. Reviewing subnational fiscal frameworks.** Austria's cooperative federalism is characterized by a complex fiscal framework in which responsibilities and revenue-sharing span multiple government layers, resulting in significant overlaps in competencies. The Fiscal Equalization Law, renegotiated every four to six years, governs tax revenue allocation across all government levels. However, this system, with its low tax autonomy for states and municipalities and considerable discretionary spending powers, creates a common-pool issue. Municipal spending

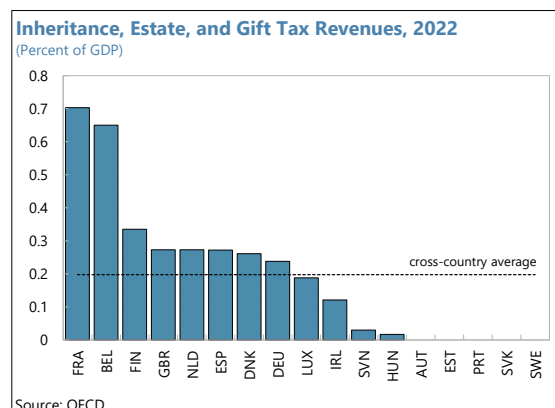
<sup>10</sup> [European Commission Ageing Report for Austria \(2021\)](#).



often does not reflect local tax contributions, drawing instead from a collective pool. In 2018, about 83 percent of total tax revenue was allocated through intricate vertical and horizontal equalization processes, incorporating historical revenue shares and population size adjustments. This structure complicates the correlation between tax liabilities and public expenditures, thus affecting incentives for strengthening revenue collection and spending efficiency. It may also foster perceptions of relaxed budget constraints, especially in the Länder.

### 13. Reintroduce inheritance and gift taxes.<sup>11</sup>

These taxes can distort estate planning decisions and promote tax avoidance behavior. On the other hand, such taxes can also improve the tax system's progressivity, and Austria's advanced IT systems and comprehensive data would help facilitate the administration of such taxes. Inheritance/gift tax average 0.2–0.3 percent of GDP across European countries.



**14. Ensuring full utilization of the RRF.** Austria is expected to receive €4 billion in grants under the EU RRF,<sup>12</sup> where 56 and 36 percent of total grants specified in the Austria's RRP have been tagged as being for the green and digital transitions, respectively. Austria has currently received €1.2 billion and will receive another €2.8 billion after fulfilling milestones and targets of the RRP

**15. Together, the reform options discussed above could generate fiscal room of over 3 percentage points of GDP per year** (Table 3). The appropriate choices among these measures and other options will depend on public preferences across various dimensions, including distributive preferences, with certain policies necessitating a period for implementation. But regardless of these preferences, rising fiscal pressures and the need to rebuild fiscal buffers underscore the need for increased consideration of various options for generating fiscal room and their relative merits and trade-offs.

**Table 3. Austria: Options for Increasing Fiscal Room**  
(In percentage points of GDP)

	2030	2040
Reducing energy-intensive subsidies	0.8	0.8
Achieving efficiencies in healthcare spending	1.0	1.0
Pension reforms	0.4	1.4
Increase property tax	0.8	0.8
Inheritance and gift tax	0.2	0.2
Enhancing government finance	n.c.	n.c.
<b>Total</b>	<b>3.2</b>	<b>4.2</b>

Source: IMF staff calculations.  
Notes: Numbers refer to savings in a given year from the reforms; n.c.: non-costed.

<sup>11</sup> Austria had an inheritance tax (*Erbschaftssteuer*) until 2008, but the constitutional court declared certain aspects unconstitutional. This ruling required the tax law to be amended. The government was unable to agree on a new version of the tax. As a result, the *Erbschaftssteuer* was indirectly abolished.

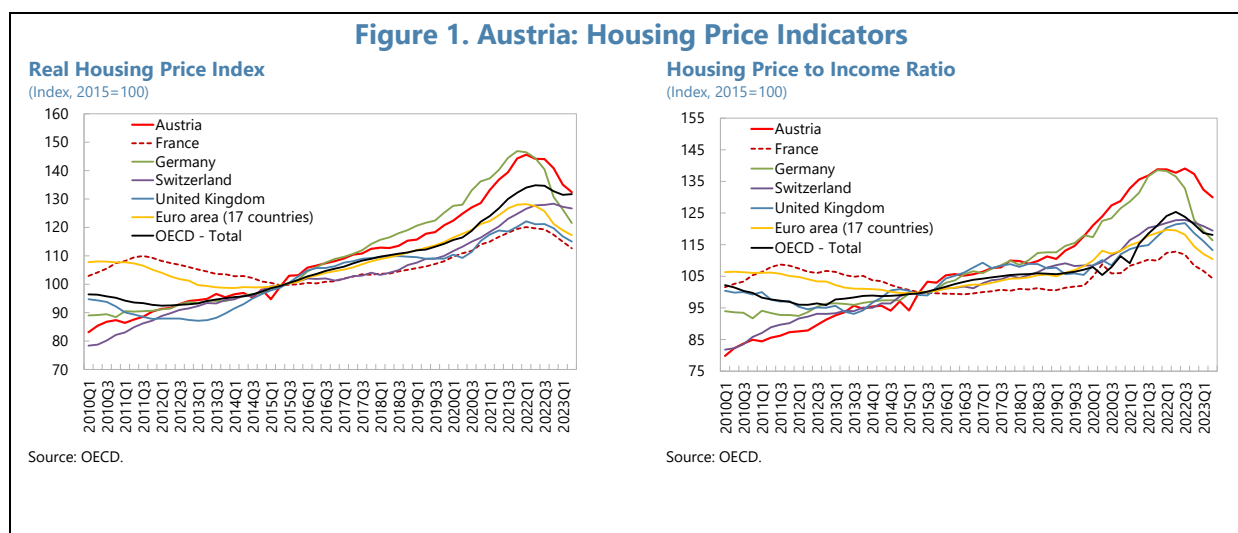
<sup>12</sup> Under the RRF, Austria has so far received €1.15 billion in total, made up of €450 million in pre-financing in September 2021 and €700 million for the first payment request disbursed in April 2023. In October 2023, the [EC](#) positively assessed Austria's modified RRF, which it requested due to factors such as high inflation and supply chain disruptions linked to the war in Ukraine.

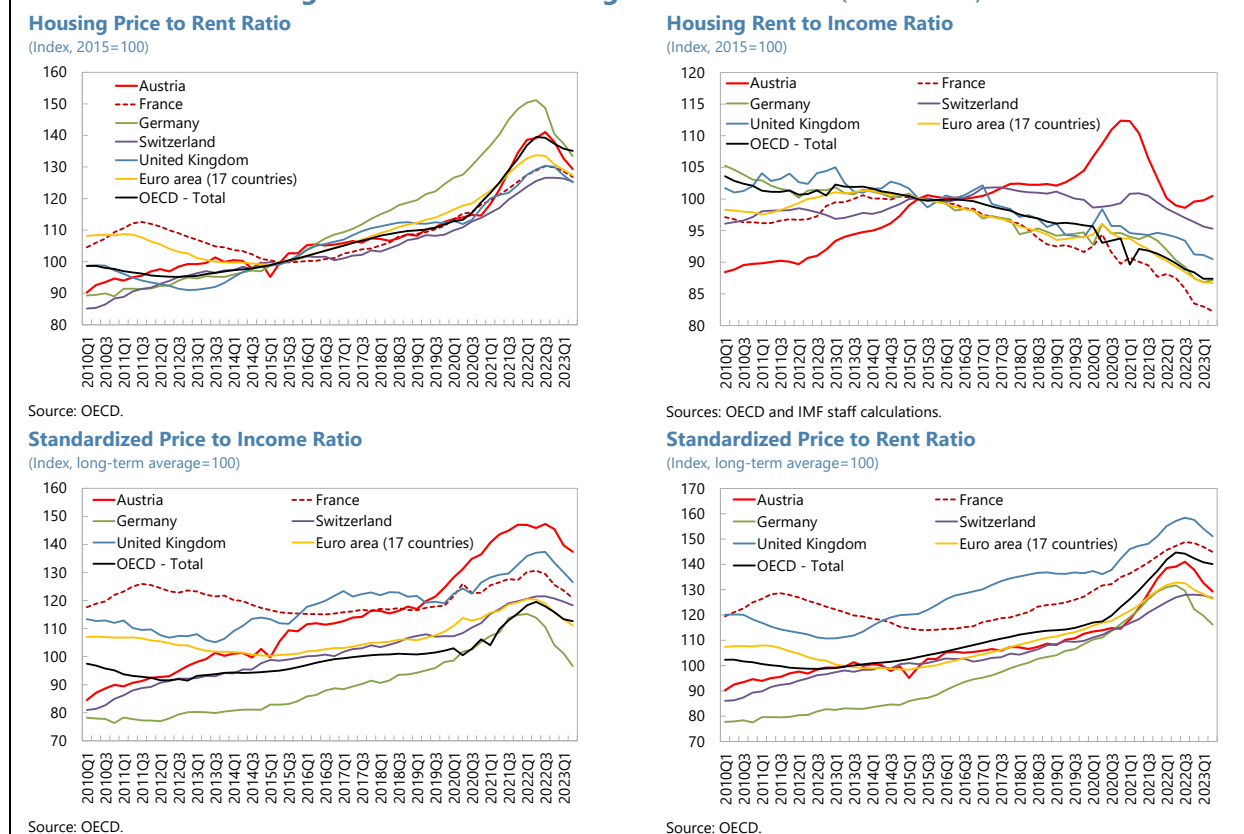
# HOUSING MARKET DEVELOPMENTS AND RELATED POLICIES

House prices in Austria rose sharply during most of the past decade, significantly reducing housing affordability. Staff analysis suggests that this reflects a combination of factors. Efforts to ease structural constraints on housing supply could help improve affordability and reduce macro-financial risks related to housing markets and mortgage debt.

**1. House prices in Austria rose sharply during most of the past decade.** According to the OECD, real house prices (as measured by nominal prices for the sale of newly built and existing dwellings divided by the consumer expenditure deflator) grew by 74 percent from 2010 to end-2021, compared with 37 percent for the OECD average (Figure 1). More recently, real house prices have fallen amid higher interest rates and inflation (between 2022Q1 and 2023Q3, real house prices declined by 10 percent due to a nominal increase of 1.6 percent and inflation of 13 percent).

**2. Standard metrics point to worsening housing affordability over the last decade in Austria compared to regional peers.** Both house price-to-income and rent-to-income ratios have increased more than the euro-area average over the last decade. Standardized ratios, defined by the OECD as the current ratios relative to their respective long-term averages, paint a similar picture. The substantial increase in both house prices and rents suggests that these increases at least partly reflect fundamental factors such as supply-demand mismatches and not just effects from low interest rates or a speculative bubble driven by loose credit standards, both of which would mainly tend to increase house prices rather than rents. Indeed, the rise in the house price-to-rent ratio has been more in line with that of regional peers. That said, the house price-to-rent ratio has increased substantially in absolute terms over the last decade, pointing to effects from low interest rates and/or overvaluation that may be broadly shared among regional peers during this period. A standard econometric model of house price valuation also points to some overvaluation (Appendix I).

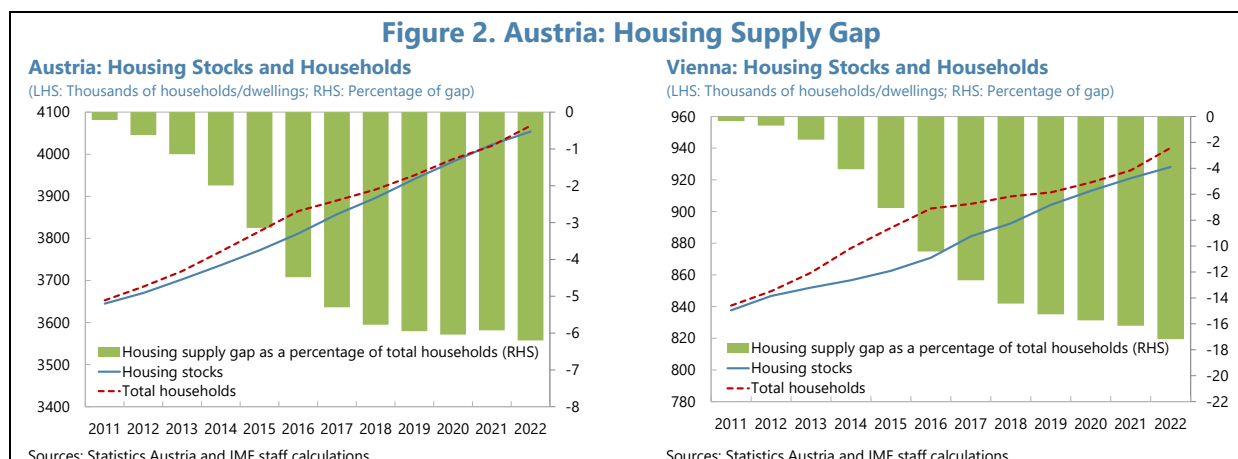


**Figure 1. Austria: Housing Price Indicators (concluded)**

**3. Housing supply appears to have fallen short of housing demand, to different magnitudes across regions.** The gap is measured as the cumulative difference between the annual supply of dwellings and the change in number of households (as a proxy for demand).<sup>1</sup> Staff estimate that the housing supply gap for Austria in 2022 was around 6 percent of the total vacancy-adjusted housing stock. The supply gap widened during the past decade and is asymmetric across regions. Vienna has the largest supply gap at 17 percent of Vienna households in 2022, similar to Tyrol, while the gap for Burgenland is only around 1.5 percent of households. Estimates from the Austrian national bank (OeNB) on supply gaps differs slightly from staff's estimates, primarily due to different assumptions made. The central bank's estimates suggest that Vienna is the only region experiencing an excess of demand in the recent episodes, while an excess of supply is likely to exist in other regions. However, both estimates suggest heterogeneity across regions regarding housing demand and supply gaps, with the largest shortfall in demand applying to Vienna.<sup>2</sup> If similar assumptions are made for estimating supply and demand by both the staff and the authorities, the conclusions converge that Vienna will be the main region subject to housing supply shortages, with other regions less so.

<sup>1</sup> See Appendix II for estimation details.

<sup>2</sup> See Schneider 2019 for the OeNB's methodologies for estimating housing supply and demand gaps.



**4. The Austrian housing market has a relatively large share of renting as compared to other European countries.** About 46 percent of Austrian households rent, compared to the EU average of 30 percent.<sup>3</sup> Austria's rental market is characterized as unitary, with competition between the private and social segments.

- *Social housing*: This segment is focused both on lower- and middle-income groups in Austria, with rents below the market level, but can compete with the private rental sector. Market power and market volume of this "subsidized housing" sector influences the price level of the private market considerably.
- *Limited Profit Housing Associations (LPHA)*: LPHA in Austria comprise altogether 190 housing cooperatives and private-limited and public-limited companies, with a total housing stock (rental dwellings and owner-occupied apartments) of 865,000 units, which represents 23 percent of the total housing stock. All LPHA together have a stable housing output of 14,000 to 16,000 units per year. This is more than half of all multi-apartment housing construction in Austria. LPHA contributes to climate targets, and some have high architectural standards. Subsidies are provided to LPHA.

**5. Austrian rental markets are subject to strong controls.** Austria has relatively strict tenant-landlord relations in favor of the tenant.<sup>4</sup> Responsibility for ensuring rental quality is shared across levels of government, and minimum size and level of comfort are required. Short-term holiday rentals are also subject to regulations, and landlords are subject to tourism tax. The state not only uses regulatory measures, but also applies price-influencing mechanisms (e.g., rent controls) to subsidized construction (e.g., social housing). Stringent rent controls could have reduced profitability of housing investment and are empirically associated with a weaker response of housing supply to change in demand, as discussed, for example, in Diamond, McQuade, and Qian (2019).

<sup>3</sup> From [European Commission data](#).

<sup>4</sup> For details, see the [OECD affordable housing survey](#) results for Austria.

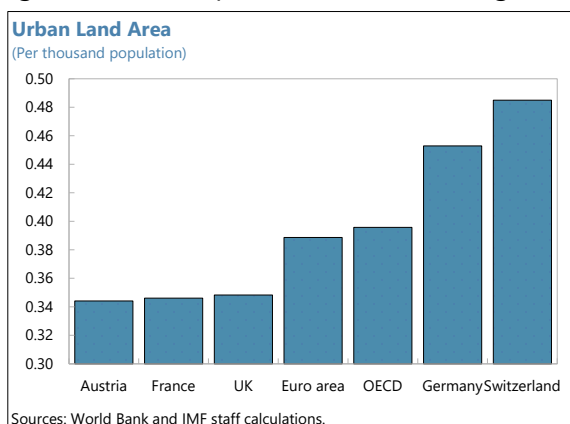
**6. Land-use regulations may also contribute to a weaker supply response.** Austria is a federal country with 3 levels of government: the national government, the state, and the municipality. Spatial and land-use plans can be enacted by different levels of government. All levels of government in Austria prepare a Spatial Development Concept jointly for the entire country. The decision-making process for land-use is not linear across levels of government, and there is no formally hierarchical planning system, increasing wait times for construction permits. Land-use regulations have been empirically linked to lower housing supply elasticity to changes in demand (e.g., Gyourko and Molloy, 2014).

**7. Notable features of Austria's land-use planning system include the following:**

- The **national government** has important tools to influence the spatial structure of the country. It plans and finances major infrastructure projects and enacts environmental and heritage protection legislation that restricts and steers the possibilities to develop land.
- **States** hold most powers related to planning and pass their own framework legislation to organize spatial and land-use planning.
- **Municipalities** hold considerable responsibilities for the strategic spatial planning within their territories as well as for the preparation of land-use plans.
- **Vienna specific:** It is difficult to build new houses in the center of Vienna and the supply of new real estate is very limited, as, some areas (e.g., Vienna's first district, also called the "Inner City"), is a UNESCO World Heritage Site with much protected architecture.

As noted by the OECD (2017), Austria has above-average land consumption and below-average

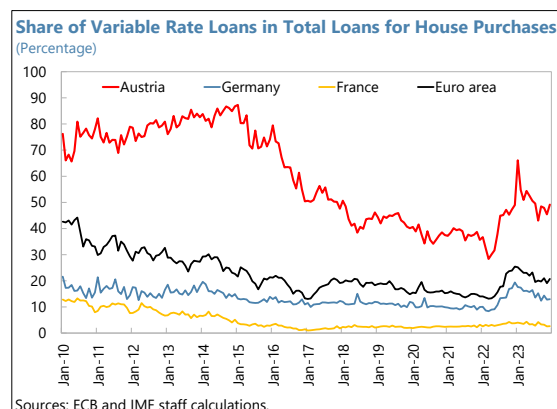
growth in developed land. In urban and intermediate regions, growth in developed land has been below population growth, whereas in rural regions the growth of developed land has been faster than population growth, resulting in increased per capita land consumption in those areas. The core parts of metropolitan areas especially experienced strong population growth without a corresponding increase in developed land. In contrast, commuting zones of metropolitan areas saw smaller increases in population and somewhat higher rates of growth of developed land. This is in line with the housing supply gap observed in Vienna, for example. The urban land area-to-population ratio is the one of the lowest among European countries.



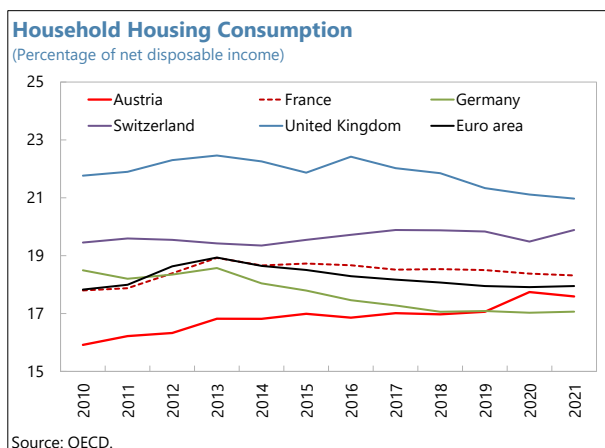
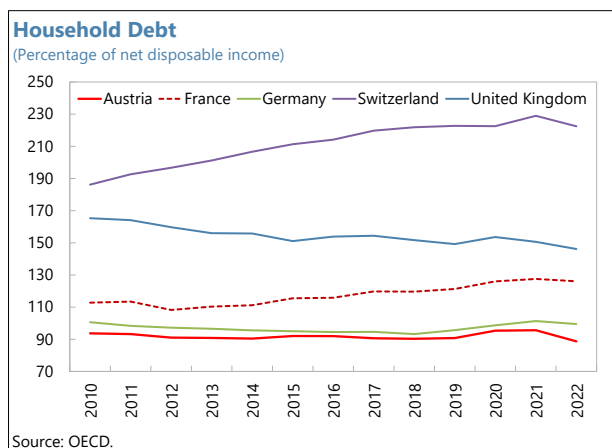
**8. Policies to address affordability need to address the underlying supply gap in housing.**

Austria provides housing allowances, which were previously only targeted to dwellings constructed with subsidies, but over the previous decade, allowances have also been provided for the

commercial rental housing sectors in view of worsening affordability. However, rising housing allowances may end up benefiting landlords over tenants if there is no underlying supply response and hence the increased housing demand simply results in higher pre-subsidy prices and rents. In this regard, avoiding excessive overlap across jurisdictions in land-use regulations could promote greater supply of land for housing. Reviewing rent controls to ensure that they do not discourage investment in private housing would also be beneficial. Finally, increased taxes on undeveloped land zoned for residential housing may also increase housing supply. The authorities announced a construction bill in early 2024 aimed at providing more dwelling units for sale and for rent. The bill includes subsidies for construction, labor costs, and renovation costs. However, less desirable demand-side measures are also set to be introduced, such as temporarily reducing transaction costs and providing interest subsidies for mortgages.



**9. Addressing housing affordability by increasing supply would also help bolster financial stability.** While housing consumption has been rising in Austria, it remains below the euro-area average, and overall household debt levels appear to remain manageable. Nonetheless, risks to macro-financial stability still arise from housing markets, especially given that Austria has a much higher share of mortgages with variable rates. ECB banking supervision on credit underwriting also indicated that mortgages with high LTV ratios and high LTI ratios increased substantially in Austria in the mid-2010s. Subsequently, in August 2022, Austria issued limits on residential real estate loans that have increased the share of sustainable loans (Box 1). Staff recommends maintaining these measures despite the recent interest-rate-driven downturn in housing markets, as prudential limits are needed as a permanent, structural measure. Moreover, the settings of the limits are not especially tight in international comparison given the substantial exemptions. In contrast, attempts to improve housing affordability by loosening credit standards could be counterproductive as looser credit may increase house prices. Efforts to improve affordability should focus instead on boosting housing supply by easing disincentives and regulatory constraints may hamper new construction (16).



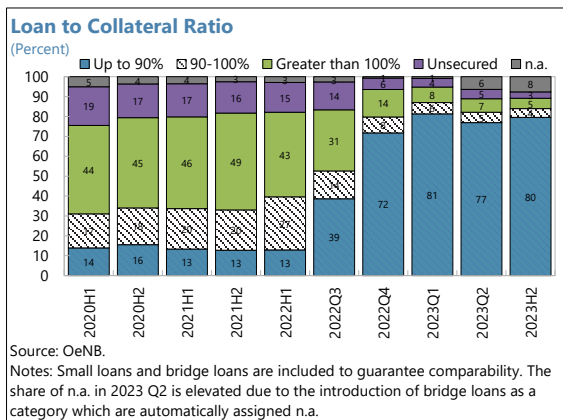
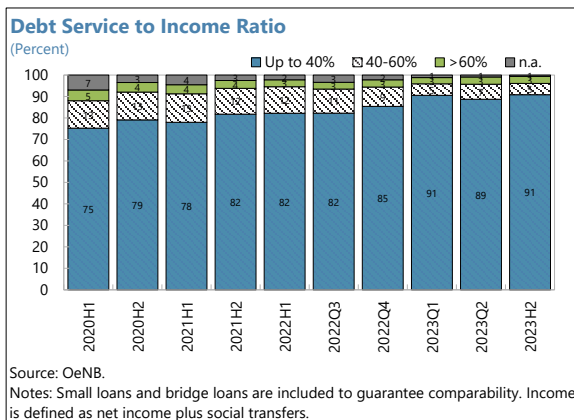
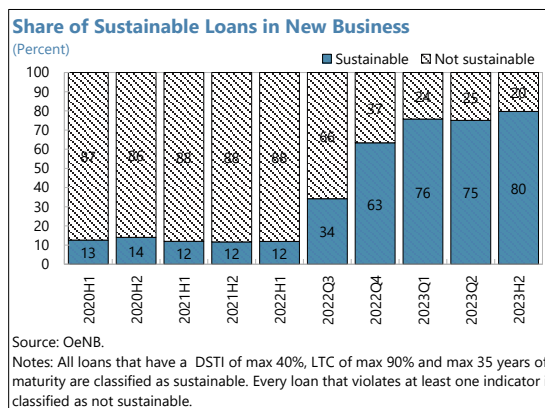
### Box 1. Austria: Borrower-Based Measures

Austria introduced a set of legally binding borrower-based macroprudential measures in August 2022 to enhance the sustainability of mortgage loans and mitigate house price growth. These measures include the following:

- An upper limit of 90 percent for loan-to-value ratios (LTV), with an exemption bucket of 20 percent.<sup>1</sup>
- An upper limit of 40 percent for debt service-to-income ratios, with an exemption bucket of 10 percent.
- An upper limit of 35 years for the maturity of loans, with an exemption bucket of 5 percent.

In addition to the measure-specific exemption buckets, a bank-level exemption bucket of 20 percent restricts the overall amount of unsustainable new loans (i.e., loans that exceed one of the limits) per bank.

Since the implementation of the measures, the share of sustainable loans has significantly increased, as indicated by the figures below. The share of loans with an LTV smaller than 90 percent has reached 80 percent among all new loans, including those in the exemption bucket and small and bridge loans. Similarly, the share of loans with a DSTI less than 40 percent has increased to 90 percent. About half of banks have reported using less than 50 percent of their exemption amount in 2023, which is attributed in part to the flexibility in reporting the period to which the exemption rate is based (either the current period or the last period, with banks choosing the period with higher loan volumes) and the minimum €1 million exemption given to small banks with lower loan volumes as well as weak demand due to high interest rates. In total, around €1 billion of the exemption amount was not used in 2023.



The measures are set to expire in mid-2025 if no agreement on extension is reached in the upcoming systemic risk review in 2024. Staff recommends making such prudential limits a permanent feature of the macro-prudential framework, as they help reduce macro-financial risks associated with mortgage markets.

<sup>1</sup> For the purposes of the regulation, the real estate value is calculated as the market value minus the value of any prior charges, but this amount cannot exceed the value of the lien entered into the land register. For this reason, the collateral value of real estate used to assess compliance with this regulation may be below the real estate's actual market value.

## References

- Andrews, D., 2010. "Real House Prices in OECD Countries: The Role of Demand Shocks and Structural and Policy Factors," *OECD Economics Department Working Papers* No. 831.
- Sanchez, A. C., and A. Johansson, 2011. "The Price Responsiveness of Housing Supply in OECD Countries," *OECD Economics Department Working Papers* No. 837.
- Diamond, R. T. McQuade, and F. Qian, 2019. "The Effects of Rent Control Expansion on Tenants, Landlords, and Inequality: Evidence from San Francisco." *American Economic Review*, 109 (9): 3365–94.
- Geng Nan, 2018. "Fundamental Drivers of House Prices in Advanced Economies", *IMF Working Paper*, No. 2018/164.
- Girouard, N., M. Kennedy M., P. van den Noord P. and C. André, 2006. "Recent House Price Developments: The Role of Fundamentals," *OECD Economics Department Working Papers* No. 475.
- Gyourko, Joseph and R. Molloy, 2015. Regulation and Housing Supply, *Handbook of Regional and Urban Economics*, Chapter 19, p. 1289–1337, Elsevier.
- Lang, J. H., M. Pirovano, M. Rusnák, and C. Schwarz, 2020. "Trends in Residential Real Estate Lending Standards and Implications for Financial Stability," *Financial Stability Review, European Central Bank*, vol. 1.
- Meen, G., 2001. "The Time-Series Behavior of House Prices: A Transatlantic Divide?" *Journal of Housing Economics* 11 (1), pp. 1–23.
- OECD 2017. *The Governance of Land Use in OECD Countries: Policy Analysis and Recommendations*, *OECD Regional Development Studies*, OECD Publishing, Paris.

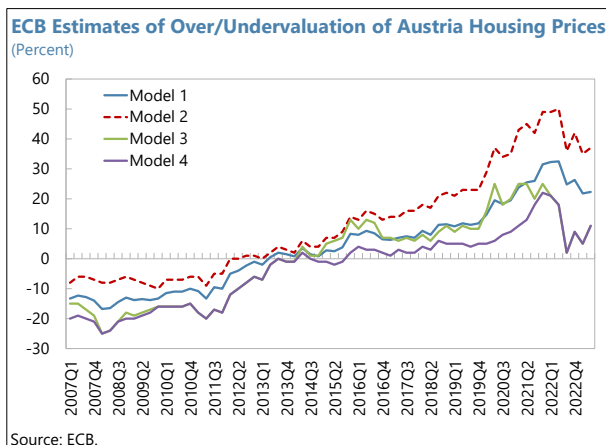


## Appendix I. A Model of Fundamental House Prices

### 1. The ECB and OeNB have both evaluated housing prices in Austria and identified housing price overvaluation in the past decade.

The OeNB utilized a number of indicators, including real housing prices, household income, price-to-rent ratio, construction costs, loan-bearing capacity, housing investment-to-GDP ratio, and interest-rate risk to construct an indicator for housing overvaluation. This indicator suggests that housing prices started to be overvalued from around 2016 and reached their peak of 40 percent in 2022 but experienced a recent correction during the high-interest rate environment.

The ECB utilized four different valuation methods to estimate a range of housing price overvaluation for Austria. The models suggest that overvaluation started in 2014 and reached its maximum level around 2022, ranging from 18 percent to 50 percent.



### 2. Staff utilize an empirical model to assess the overvaluation of housing prices for Austria following Geng (2018).

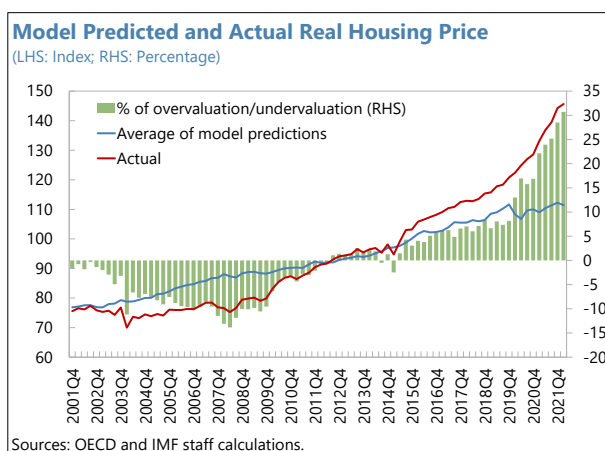
The panel data covers EU countries from 1970-2023, depending on data availabilities. The baseline model includes supply factors and demand factors to uncover the underlying housing prices.

$$RHP_{i,t} = F(\text{Supply}_{i,t}, \text{Demand}_{i,t}) + \epsilon_{i,t}$$

<b>Definition of variables</b>		
permit	Building permit index with 2015=100.	Log
morr	Mortgage rate on new loans	
pop	Population	Log
realwage	Real wage, gross wage divided by CPI	Log
ltr	Long-term interest rate	
shrprices	Domestic shared prices index with 2015=100	Log
cre	Credit to private sector	Log

**3. The table presents the panel regression results.** Three models are examined, including different sets of supply and demand variables. Population growth and real wage growth have both shown positive and significant effects on the growth of real house prices.<sup>1</sup> Model 2 suggests that the mortgage rate, which theoretically would directly influence the demand of housing, has a negative effect on real housing price growth. Model 3 further includes other financial variables, including a long-term interest rate, equity prices, and credit growth. The long-term interest rate captures the negative impact on housing prices from the mortgage rate, while credit growth contributes significantly and positive to housing prices. However, growth in construction permits for housing is found to be positively correlated to housing prices, which is counterintuitive. This could indicate that housing permits react to housing prices instead of the other way around.

**4. All three models generate similar “fundamental” housing prices for Austria.** Compared to the actual housing prices, the average predicted prices from the model suggests that housing prices were undervalued from 2000–2012 and then became overvalued ever since. The model estimates overvaluation in 2022 to be around 30 percent, broadly in line with ECB and OeNB estimates.

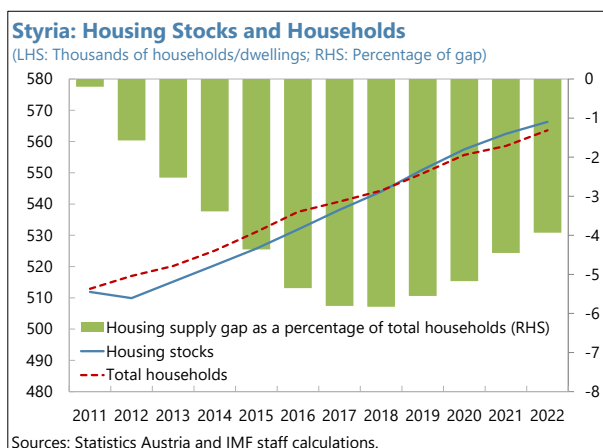
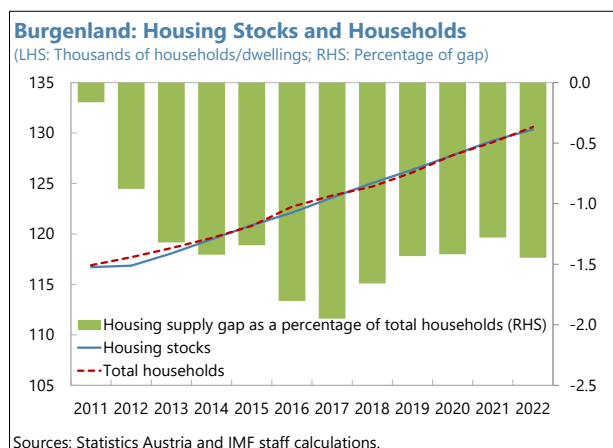


Real Housing Prices			
	Baseline Model	Model 2	Model 3
permit	0.097*** (0.024)	0.121*** (0.028)	0.133*** (0.021)
morr		-0.017*** (0.006)	-0.0004 (0.005)
pop	1.073* (0.520)	1.118*** (0.430)	0.514 (0.379)
realwage	0.778*** (0.136)	0.698*** (0.136)	0.491*** (0.113)
ltr			-0.009* (0.005)
shrprices			0.011 (0.020)
cre			0.186*** (0.043)
Observations	2,112	1,378	1,214
Adjusted R <sup>2</sup>	0.652	0.694	0.753
Note: * = p-value<0.10; ** = p-value<0.05; *** = p-value<0.01			

<sup>1</sup> See for example [Geng \(2018\)](#), [Andrews, D. \(2010\)](#), and [Meen, G.\(2001\)](#)

## Appendix II. Estimates of Housing Supply Gaps in Austria

- To estimate housing supply, data on existing housing stocks, annual new construction of housing units, completion rates, and vacancy rates are utilized.** Existing housing stock data for Austria and its nine states are available for the years 2011 and 2021 from housing surveys. Annual construction permits are aggregated over the ten-year period and compared to the increase in housing stocks between 2021 and 2011 to calculate the construction completion rate. Annual housing stocks are then extrapolated using the completion rate and annual construction permits. The vacancy rate is calculated by comparing the total housing stocks to the number of vacant houses reported in the 2011 and 2021 housing surveys. The final housing supply is adjusted using the vacancy rate.
- On the housing demand side, the number of private households is used as a proxy for housing demand.** The supply gaps are assumed to accumulate over years. In other words, households that were not able to be matched with a housing unit in year  $t$  are assumed to remain in shortage of housing units in year  $t+1$ . New households are assumed to join the group with no housing units in year  $t+1$  based on the new supply gap. The supply gap will reverse only if aggregate housing supply exceeds aggregate housing demand.
- The housing supply and demand gap for states with smaller housing supply gaps are shown below:**



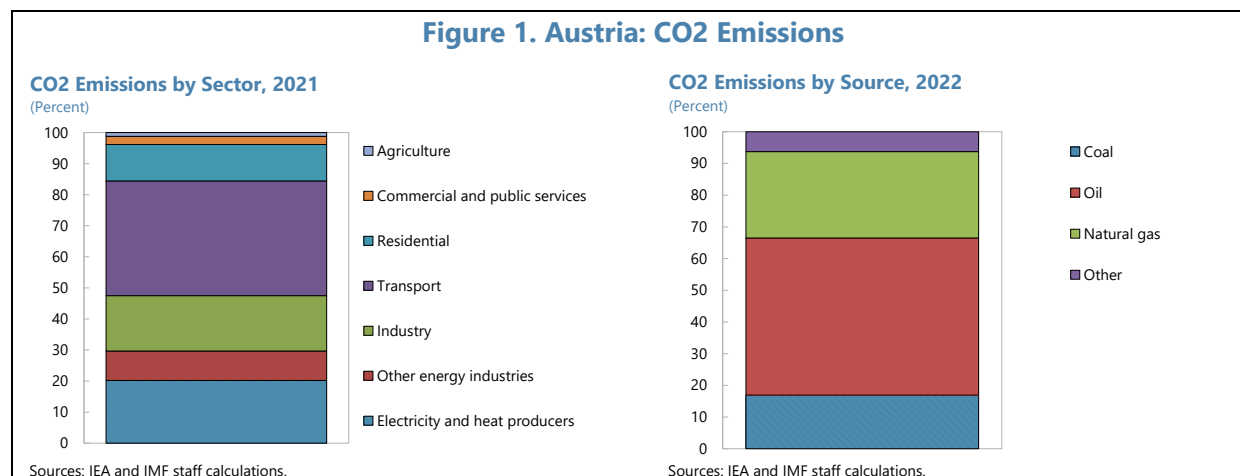
## ACCELERATING THE GREEN TRANSITION

Austria has made significant strides in the green transition, including introducing carbon pricing under the National Emissions Certificate Trading Act in Oct 2022, and increasing the share of renewable energy. However, additional efforts are required to meet its ambitious emission reduction targets as promised to the EU. Renewable energy usage should be significantly boosted in the future, and resources for the green transition should be secured. Removing bottlenecks for the green transition, including expanding electricity grids, reducing delays in investment permitting, and closing skilled labor gaps, are essential to speed up the process.

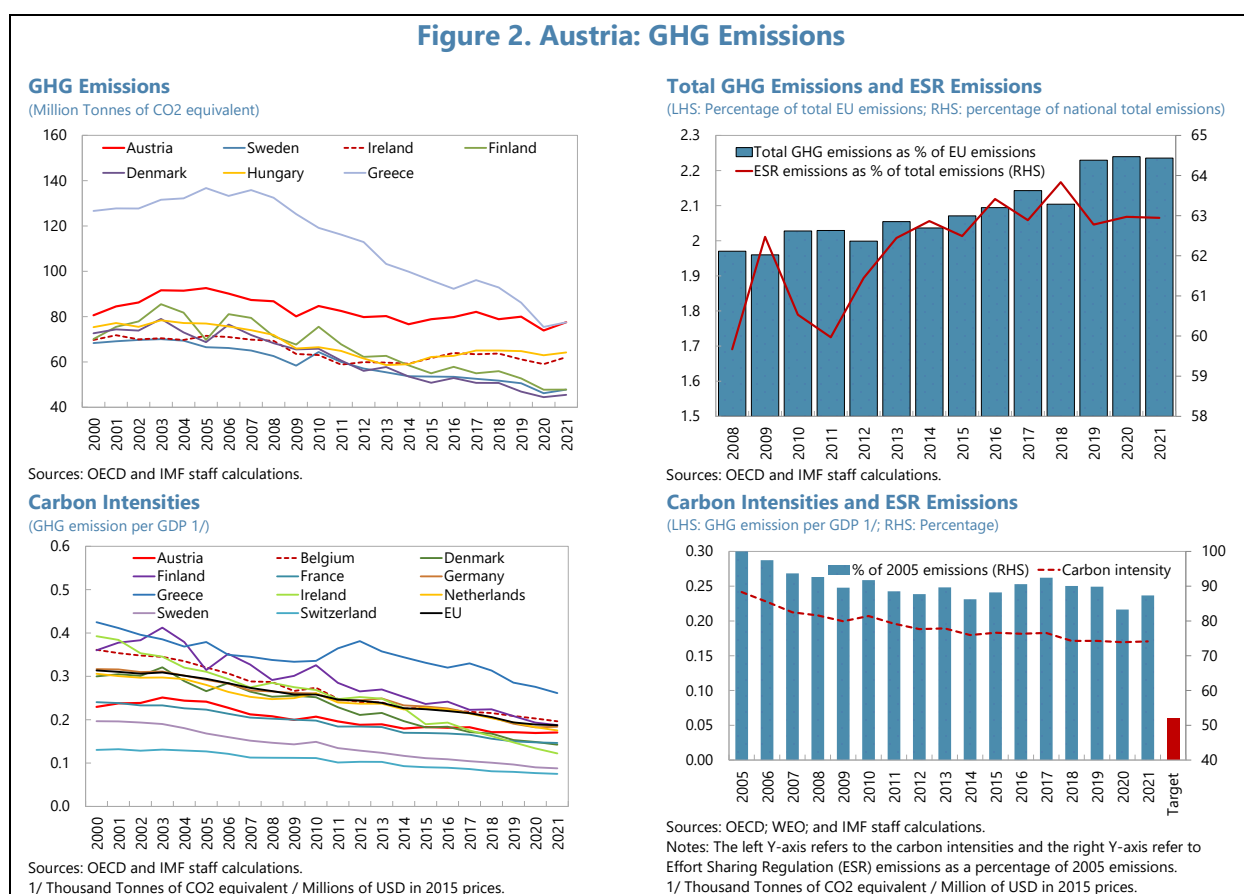
### 1. The Austria National Emissions Certificate Trading Act 2022 (NEHG) commenced in October 2022, introducing a carbon pricing instrument as part of an emission trading scheme.

Hereby, energy sources may only be placed on the market if emission allowances have been acquired. Currently the NEHG covers emissions outside the European Emission Trading Scheme (EU ETS), including emissions in the building sector, transport not included in the ETS, agriculture, waste, and small industrial plants (comprising 40 percent of total CO<sub>2</sub> emissions). The energy sources covered include gasoline, gas oil, heating oil, natural gas, liquefied gas, coal, and kerosene. Each energy source is assigned a GHG emission factor, and the list of sources can be expanded by regulation. From October 2022 until December 2025, emission allowances have a fixed-issue value starting at €30 and rising to €55 per ton in 2025, with 50 percent downward (upward) adjustments to the stepped increase if energy prices rise (fall) by more than 12.5 percent during the first nine months of a given year. The 2026 price will be kept at €55 per ton if no agreement on price change is achieved. From 2027 onwards, the NEHG will be transitioned to the EU ETS II, covering buildings and road transport sectors. For sectors outside of EU ETS I and EU ETS II (e.g., agriculture), new plans will be developed. An important feature of this carbon pricing scheme is the redistribution of the revenues to households, taking the form of a basic lump-sum payout plus a regionally differentiated top-up due to varying density of public transport. The lump-sum payout implies that low-income households receive more than they pay via carbon pricing. A first evaluation of the NEHG is expected by mid-December 2024, which will cover the specification of the market phase in line with Austria's climate targets and an evaluation of the maintenance of exemptions for certain sectors.

Figure 1. Austria: CO<sub>2</sub> Emissions



**2. Notwithstanding the introduction of the carbon price, additional efforts are required to meet the EU Effort Sharing Regulations (ESR) in Austria.** The ESR aims for an ambitious 48 percent reduction in non-ETS emissions compared to 2005 by 2030. Austria's carbon intensity is below the EU average, with Austria currently contributing 2.2 percent of the EU's greenhouse gas (GHG) emissions. However, this share has increased since 2000, signaling a slower pace of reduction compared to other EU countries. Between 2005-2021, the pace of reducing non-ETS emissions was sluggish, with the trajectory significantly lagging that needed to meet the 2030 target. Faster progress was, however, made in 2022 and 2023 when ESR emissions declined year-on-year by 5.0 percent and 4.6 percent, respectively, so that these emissions were lower by 22.4 percent in 2023 compared to 2005. Nevertheless, the effort required to meet the 2030 target remains large and would need to include some combination of further carbon price increases, more green public investment, and regulatory changes (previous IMF staff estimates suggest that a carbon price in the range of €100–€150 per metric ton by 2030 could reduce emissions by about 20 percent relative to the baseline (no policy measure) emission path).<sup>1</sup>



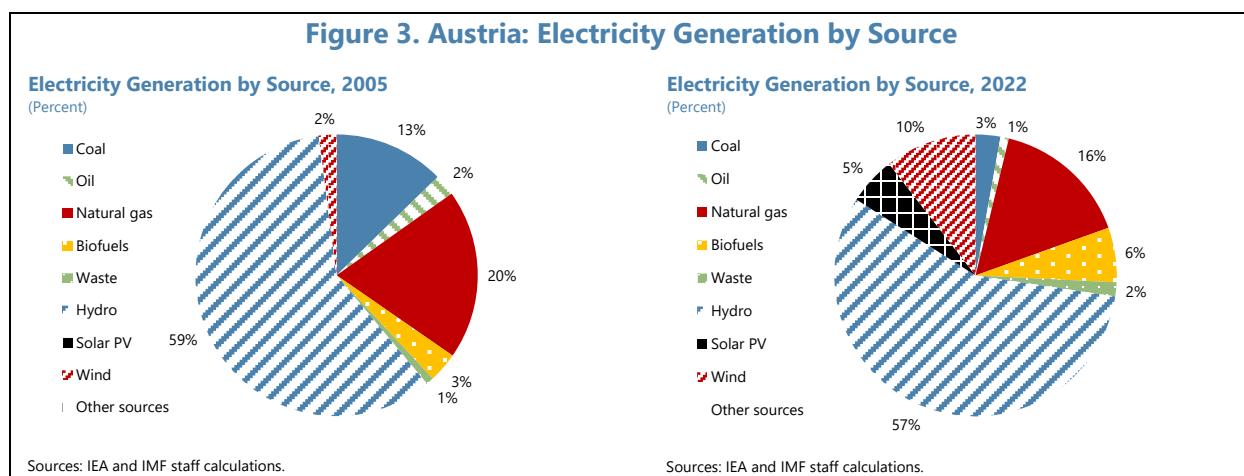
**3. As part of the reduction in GHG emissions, Austria aims to achieve 100 percent renewable electricity generation by 2030.** Austria has made progress by fulfilling its 2020 target of achieving an overall renewable energy share of 34 percent. Electricity generation from solar, wind,

<sup>1</sup> See [IMF SM/22/215](https://www.imf.org/en/Publications/SM/2022/215)

and hydro sources have been significantly increased. In its Mission 2030 climate strategy plans, Austria has outlined guidelines for forthcoming climate investments and flagship projects. These flagship projects have been underpinned by significant increases of subsidies for green transformation and green mobility, which partly incorporate a social dimension. At the same time, new EU legislation has also promoted decarbonization, e. g. via the decision to gradually tighten CO<sub>2</sub> emission standards for new cars and vans, reaching 100 percent reduction by 2035.

- **Flagship projects in transportation** encompass the design and implementation of more efficient freight transportation logistics, promotion of public transportation through infrastructure enhancements, electrification of road vehicles, and research initiatives in promoting and implementing renewable energy uses.
- **Flagship projects in space heating** will focus on implementing thermal building renovation, promoting renewable indoor heating solutions, and installing photovoltaic systems on building surfaces.

**4. Several measures related to renewable energy have recently been implemented.** An industry transformation plan was formulated in late 2022, with €3 billion dedicated to transforming the energy-insensitive sector up to 2027. A renewable heating law was passed recently, prohibiting fossil fuel usage in newly constructed buildings since January 2024. Subsidies have also been provided to households in existing buildings to upgrade the heating system to be based on renewable energy, with an additional spending volume for the period 2024-2030 agreed recently. These subsidies have a particularly large top-up for low-income households. A Renewable Gas Act and a Green Hydrogen Act are also under discussion, focusing on increasing green gas and green hydrogen production.



**5. Meeting climate targets is likely to require significant additional resources.** Significant new investment is needed to achieve the goals of 48 percent of reduction in non-ESR emission compared to 2005 and 100 percent electricity from renewable energy sources by 2030. Such investment needs include both generation and network costs of the green transition. Part of the generation cost and network cost could be met by the substitution from brown to green energy

generation and savings from brown energy subsidies. However, new infrastructure for electricity transmission and end-user accessibility is likely to be an additional cost to the economy. Staff estimate around 0.7–2.7 percent of GDP from the budget each year should be devoted to the green investment for Austria to achieve its 2030 goal (staff estimate that public investment in the green transition was 0.2 percent of GDP in 2023). Fiscal cost estimates are highly uncertain in part because they depend importantly on how much carbon prices and/or regulations that promote the green transition are increased, as such measures would encourage more private-sector participation in green transition efforts, reducing the costs for the public sector.<sup>2</sup>

**6. The Austrian government has mobilized some resources from both international sources and domestic funds for the green transition.** A total of €3.96 billion has been granted to Austria from the EU Recovery and Resilience Facility (RRF). Nearly 40 percent of this amount comes under the heading of green spending, available up to end-2026. Over €1 billion of the €3.96 billion has already been disbursed, and approximately €160 million from this funding has been allocated to support the green transition. EU Structural Policy Funds are set to invest €789 million in the green transition as part of Austria's total allocation of €2.9 billion for the period 2021–2027. Additionally, Austria benefits from other EU programs, including the Connecting Europe Facility, Horizon Europe, and others. On the national front, efforts include the initiation of green security issuances to attract private sector investments. Approximately €5.1 billion has been raised through these issuances, and these funds have been designated for green projects in 2021 and 2022.

**7. In addition to garnering adequate resources, removing administrative, infrastructure, and resource bottlenecks will be necessary to speed up renewable energy development.**

- **Reducing delays in permitting** is a critical area requiring attention. Investment in renewable energy is hampered by complex spatial planning and permitting procedures. For example, the permitting process for wind energy infrastructure currently takes around 5 years on average, which is well above the 2 years objective included in the EU's Renewable Energy Directive. These lengthy procedures are partly due to staffing problems and the complex division of powers between the federal and regional governments. A step towards speeding up these procedures has been taken through the adoption of a more streamlined law on environmental impact assessments. A renewable expansion acceleration act is also under political consultation, investigating all related steps in getting a permit and identifying the potential roadblocks. As an example, multiple projects by the same developers could be combined to go through only one permitting process.
- **Expanding the electricity grid** is crucial to facilitate the integration of more renewable energy into the network. This challenge is not unique to Austria. Currently, the grid in Austria is not under significant strain, as the share of renewable energy has not yet reached its target. However, as the generation of electricity from renewables increases, the challenge will emerge.

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<sup>2</sup> See Chapter 3, "Building Fiscal Room in Austria".

Addressing the regulatory hurdles mentioned earlier will also help facilitate the development of large ground-mounted network systems.

- **Addressing skilled labor shortages** will also be needed to facilitate the green transition. In 2022, reports indicated shortages of workers in 17 occupations crucial for the green transition in Austria, such as civil-engineering technicians, roofers, and mechanical engineers.<sup>3</sup> Efforts are being made to address these shortages, with participation in upskilling and reskilling programs in Austria in energy-intensive industries exceeding the EU average (16.2 percent compared to 10 percent).<sup>4</sup> Further efforts to address the skill gap would be helpful, including possibly through skilled migration and encouraging wider participation in green-transition-related training and education programs. A green labor foundation has already been established, bringing employers and employees together for training purposes.

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<sup>3</sup> European Labor Authority (2023), [EURES Report on labor shortages and surpluses 2022](#).

<sup>4</sup> European Commission, [2023 Country Report – Austria](#).