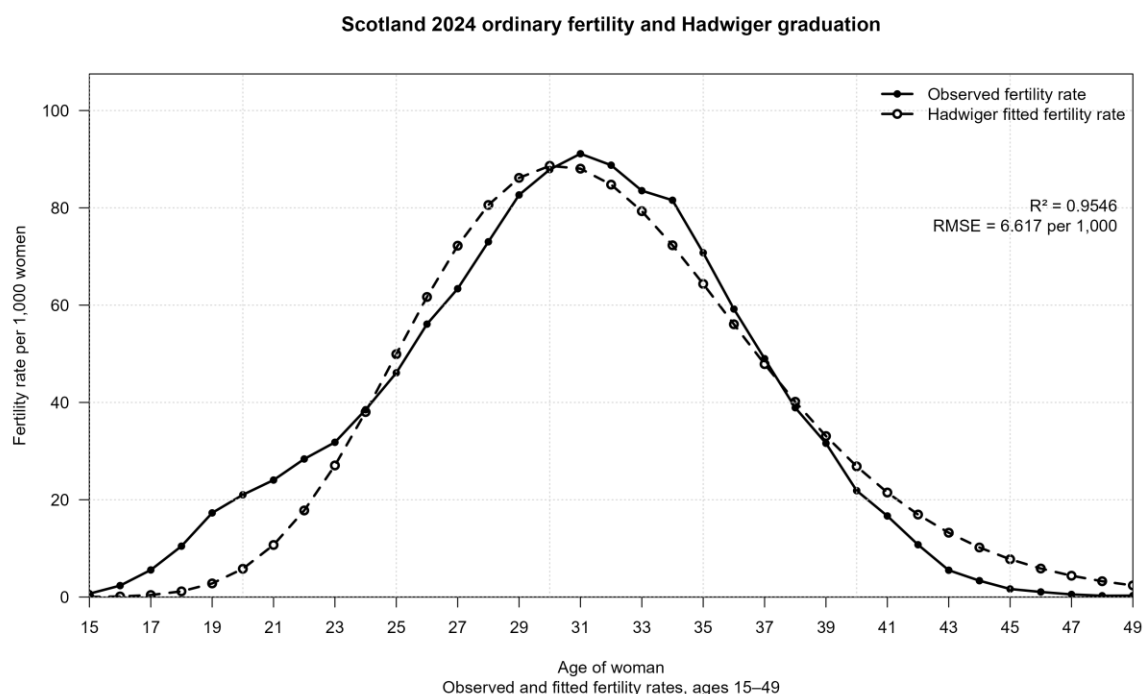


Graduation of Fertility Rates in Scotland in 2024 for Purposes of Making Forward Projections.

Using the 2024 population as reported by National Record Scotland (NRS), we compare our alternative projection with the forecast projection that the Office for National Statistics (ONS) has published with NRS.

Our alternative projection assumes that fertility continues in the future in line with what is reported for 2024 in Scotland. We use an appropriate graduation by fitting a Hadwiger distribution, so that we are using a smooth progression age-to-age of fertility rates.

Figure 1: The observed fertility rate and Hadwiger fitted fertility rate for Scotland in 2024 for women aged 15-49.

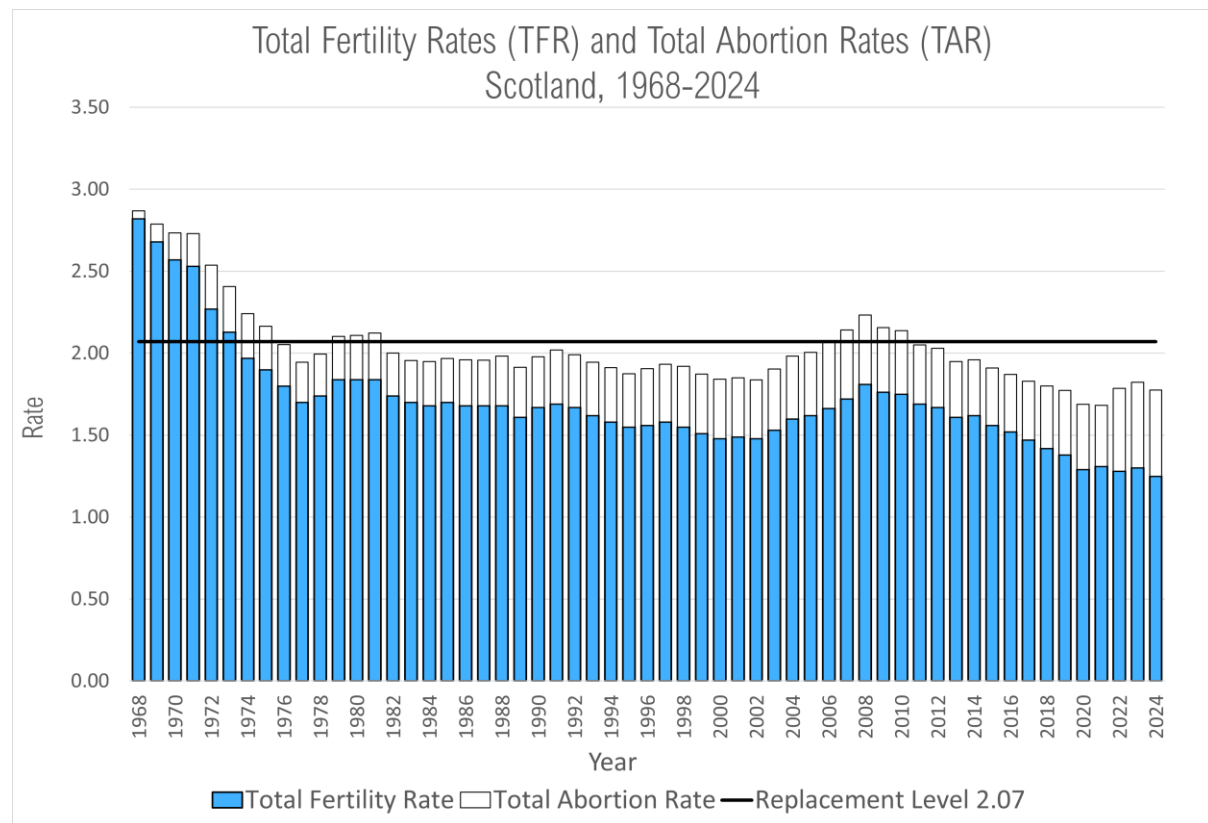


The graph in **Figure 1** shows how **Scotland's observed age-specific fertility rates in 2024** compare with a **Hadwiger mathematical fitted distribution** for women aged 15–49. Fertility rises rapidly through the twenties, reaches its observed peak at around **age 31 at roughly 90 births per 1,000 women**, and then declines through the thirties and forties.

The coefficient of determination, R^2 is 0.9546 when we have fitted the Hadwiger model to the observed fertility profile. The **mean squared error of 6.617 births per 1,000 women** gives an indication of the goodness of fit.

For our alternative projection, we have estimated augmented fertility rates where we have added 90% of the abortion rate at each age to arrive at a hypothetical fertility rate were it not for abortion.

Figure 2 shows the Total Fertility Rates and Total Abortion Rates for Scotland from 1968 to 2024.



Total fertility rates are as published by National Record Scotland (NRS). Total abortion rates are calculated in the same way as total fertility rates using the age-specific numbers of abortions at each age of women and the mid-year female population estimates by single year of age published by NRS.

Fertility continues to decline and abortion to increase. In Scotland, fertility exceeded replacement level in the 1960s and has now declined to considerably under replacement level. The shortfall below replacement level can largely be accounted for by the increased abortion rate.

The fitted Hadwiger curve with this augmentation is shown in **Figure 3**.

Figure 3: The observed augmented rate and the modelled augmented rate with a Hadwiger fitted augmented rate for Scotland in 2024 for women aged 15-49.

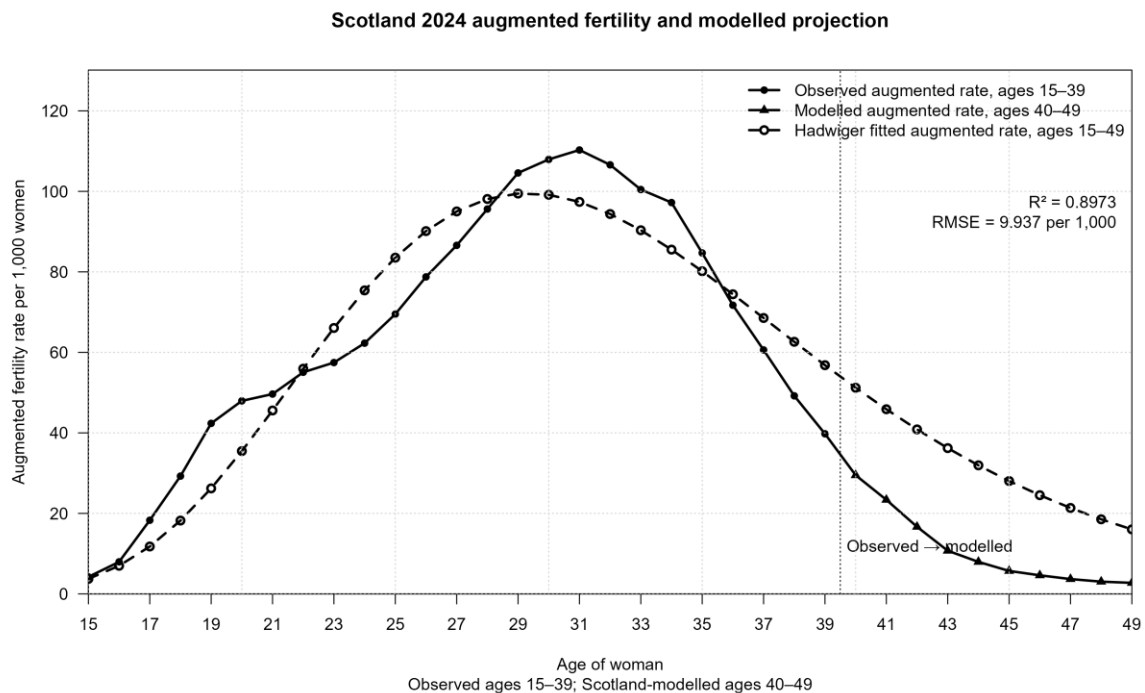


Figure 3 shows the **difference between Scotland’s observed fertility age distribution and the augmented fertility age distribution**, which incorporates the age-specific allowance for pregnancies ending in abortion. The effect is not uniform across reproductive ages. The augmentation has a **larger influence at younger ages**. The augmented rate reaches about **110 per 1,000 women around age 31**, compared with roughly **90 per 1,000 in the ordinary fertility profile**.

The **Hadwiger curve** converts this augmented profile into a smooth age-specific schedule for population projection, where **R^2 at 0.8973** indicates the fit. The augmented rates sum to Total Fertility Rate compared to the observed 2024 Total Fertility Rate.

Figure 4: Scotland official and augmented-fertility population projections from 2024 to 2049 focusing on the base year 2024, 2031, 2041 and 2049 separated into three age groups being 0-15, 16-66 and 67+.

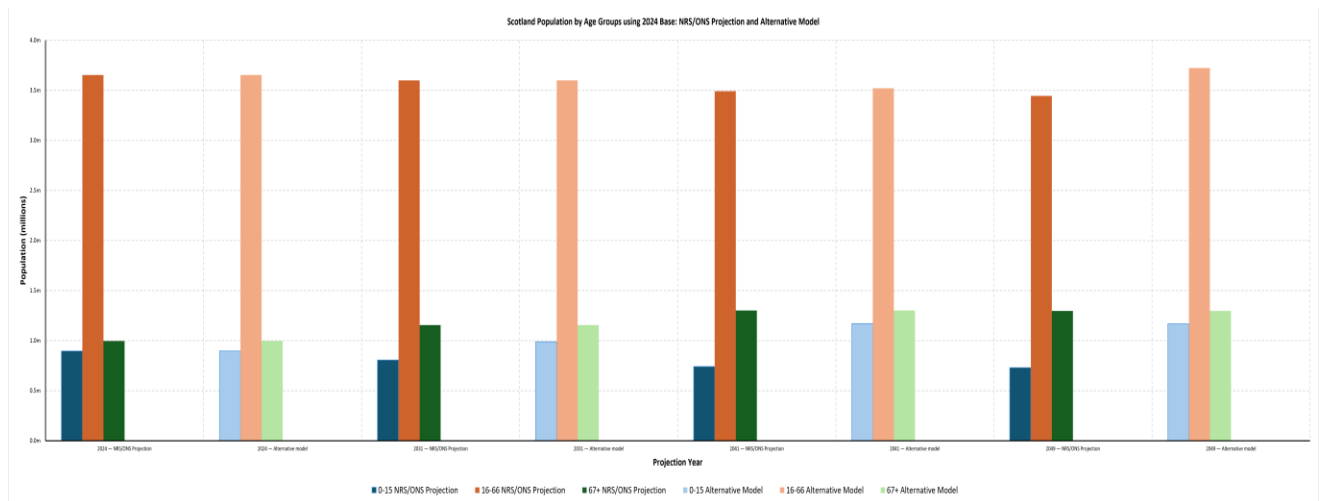


Figure 4 compares the **NRS/ONS projection for Scotland with the alternative population model incorporating an allowance for abortions becoming live births**, showing how the demographic effect develops across the **age range of children (0-15), the working population (16-66) and retirement (67+) age groups**. Both projections are made from the same 2024 base. The difference becomes evident as the effect of the alternative fertility assumptions accumulate. The **effect is apparent in the 0-15 population** in the first fifteen years.

By **2049**, the NRS/ONS projection suggests Scotland's **0-15 population will fall to approximately 0.73 million**, compared with around **1.17 million in the alternative model**—a difference of roughly **437,000 children**. This illustrates the potential scale of Scotland's demographic challenge if fertility remains low. A sustained decline in the number of children would progressively reduce demand for **nurseries, schools, colleges and eventually universities**, potentially leading to school consolidation or closures, reduced staffing requirements and greater financial pressure on educational institutions. The alternative models show how if it were possible to replace abortions with live births a larger population of children could avert the need to close schools.

The effect then manifests in the **16-66 working-age population** as the additional modelled birth cohorts age. The difference by 2049 is apparent with the alternative model leading to approximately **3.71 million people aged 16-66 compared to 3.43 million** under the official projection. In contrast, the **67+ population remains around 1.30 million in both scenarios**. People born as a consequence of the alternative fertility assumptions do not become old enough to enter this group within the projection period. The ratio of working age population to retirement age population is more favourable in the alternative projection.