Technical appendix: Alternative local labour market statistics for Scotland

This appendix lays out the data and methods used to derive the administrative data-based estimates of key labour market statistics in the accompanying report.

The estimates include employment, inactivity, and unemployment counts and rates for those aged 16+ and 16-64. Additional estimates include employees and self-employed for ages 16+ and a measure of who wants to work for the working-age population, which goes beyond unemployment to include a proportion of inactive people who may want to enter the labour market under the right conditions.

All estimates are produced at the local authority level for local authorities in Scotland, as well as at the Scotland level. The data span 2014Q2 – 2025Q4 and will be regularly updated in a data dashboard.

Sources of data

The table below shows the data sources used in the estimates, as well as their frequency and level of geography.

Description	Source	Frequency	Age range	Geography
Population estimates and projections	National Records of Scotland (NRS)	Annual	All (single year)	Local authority
Payrolled employees by region counts (PAYE RTI, SA)	HMRC	Monthly	16+	Local administrative units (LAU), aggregated to Local Authority
Self-employed counts	HMRC	Annual	16+	Local authority
Employment rates by age band	Scottish Census	Every 10 years	16+ (by age group)	Local authority
Additional self-employment data	Survey of Personal Incomes (SPI)	Annual	16+	Scotland
Adjustments to SPI self-employment data pre-2018/19	Institute for Fiscal Studies (IFS)	Annual	16+	UK
Ratio of inactivity to unemployment	Annual Population Survey (APS)	Quarterly*	16-64	Local authority
% of inactive who want to work	APS	Quarterly*	16-64	Local authority

** Quarterly APS data is a 12-month estimate ending in the specified quarter. For example, the estimate for the first quarter of 2015 is based on data from April 2014 through March 2015.*

Each main data source is discussed below.

Population

Annual population estimates by age and local authority are taken from NRS data [1]. Where population data have not yet been published, we use NRS projections [2].

The relevant population estimate or projection is applied to Q2 of each calendar year and a smoothed value is applied to each quarter in between for each local authority. This assumes that short-term population changes happen evenly across the year.

Employees

The number of employees is taken from Pay As You Earn Real Time Information, seasonally adjusted (PAYE RTI-SA) data. This provides monthly employee counts and is updated on a quarterly basis to local administrative units (LAU), which we then aggregate to Local Authority level. In the PAYE-RTI publication, this geography is mistakenly labelled as LAU; while most LAUs map directly to LA, the Highlands, Moray, and Argyll and Bute are divided into smaller subregions.

Note that this data is number of employees, not number of jobs, and does not need to be adjusted to account for employees with multiple jobs.

We aggregate to quarterly data by averaging monthly estimates within each quarter.

There are some differences between PAYE RTI coverage and the people that are included in the Labour Force Survey (LFS) and Annual Population Survey (APS). PAYE RTI includes those in the armed forces and others living in communal establishments where the LFS and APS do not. It also captures temporary foreign workers who pay UK tax, but who are not resident in the UK and therefore do not appear in the LFS and APS. While the ONS does publish UK-level statistics on quantifiable adjustments to better match employment as measured by these two data sources [3], we do not have a meaningful way of apportioning these to local authorities. We therefore do not make this adjustment.

On the other hand, some types of workers are counted in the LFS and APS as employed but do not appear in PAYE RTI statistics; the adjustment to include these workers is discussed in the section below entitled “APS-based information.”

Self-employment

Self-employment data are obtained from HMRC statistics on tax receipts (“Table 3.14 Income and tax by borough and district or unitary authority”) [4]. They are available annually on a tax year basis through 2023-24 and represent the number of people who are self-employed and pay tax.

We also bring in information from the Survey of Personal Incomes (SPI) on the proportion of self-employed people in Scotland who do not pay tax and the proportion that are also employees [5]. We use the SPI rather than HMRC publications so we can obtain estimates specific to Scotland (although note that we do not do this by local authority, which would require secure data access). We use these SPI proportions to remove a share of employees’ who are also self-employed, and to add a share that are non-taxpayers.

Finally, there is a known issue with self-employment statistics prior to 2018-19, when the weighting method used in the Survey of Personal Incomes (a 1% sample of all UK taxpayers) resulted in overcounting of self-employment. The figures have been corrected from 2018-19 onwards, but not in years prior. The IFS has published their own series correcting the figures at the UK level using secure HMRC data [6]. We assume that a similar correction factor applies to Scotland and Scottish local authorities and use the UK-level adjustment in each tax year prior to 2018-19 on our self-employment figures.

Unlike population counts, we do not have a clear rationale for smoothing the self-employment series between tax years, so we leave this series with a flat value for each tax year.

Employment rates by age

We use Census data as the source of employment rates for those over 65, which are then used to estimate total employment among working age people (16-64).

Because our data series starts in 2014, we draw on both the 2011 and 2022 Census [7], [8].

We calculate employment rates for ages 65-74 and 75+ for Scotland and each local authority, then apply a linear progression between the rates over time. Rates after the 2022 Census are assumed to stay constant.

To estimate 65+ employment in each quarter, the calculated employment rates for each area and age group are applied to the population from that age group and added across age groups.

APS-based information

People in ‘other’ jobs

Some types of workers are considered employed in the LFS/APS but are not captured in PAYE RTI data. Specifically, these workers are people in certain types of government training schemes and unpaid individuals that work for a family business. We calculate the proportion of workers with these “other” job types from APS data for each local authority, then apply that proportion to our employee figures.

Inactivity and unemployment

We obtain an estimate of the non-working population by subtracting estimated total employment from the population size. This is then split into inactivity and unemployment.

The distinction between inactivity and unemployment is based on whether someone wants to work, is searching for work, and is ready to start work in the near future. This information cannot be obtained from administrative data at present.

Instead, we use the ratio of inactivity to unemployment in the APS to split our estimated non-working population. To the extent that this ratio is accurate (even when overall grossed figures are less so), our estimates are reasonable approximations of inactivity and unemployment.

People who want to work

The APS also asks economically inactive people if they would like to work. We use this proportion to estimate a "wants to work" measure that is the sum of unemployment and the proportion of inactive people who say they want to work. More detail on what this looks like across Scotland can be found in the FAI report *Understanding local labour markets across Scotland* and the accompanying dashboard.

Estimating employment

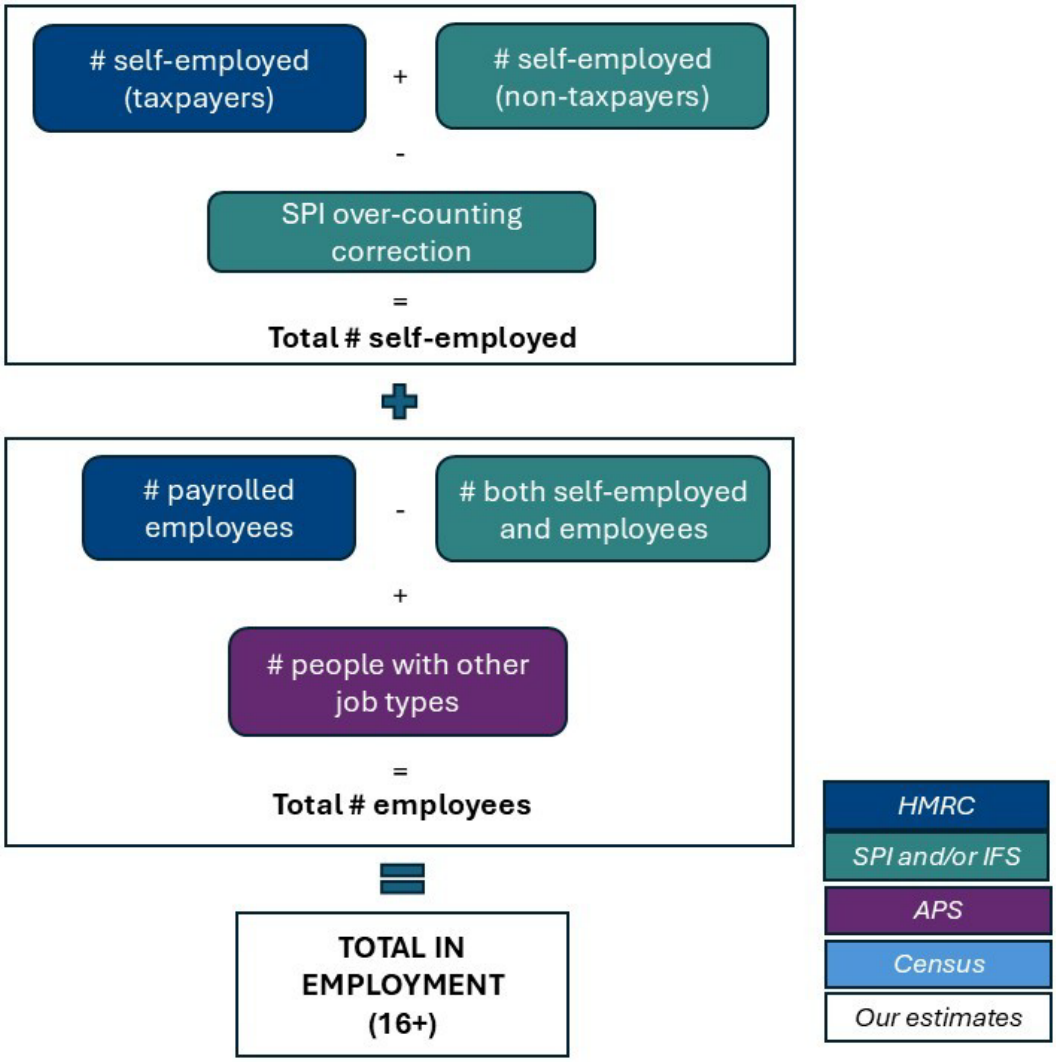
The process for estimating the number of people aged 16+ in employment by local authority is:

- **Estimate self-employment:** Use proportions of self-employed people who do not pay tax in Scotland from the SPI. Apply these to HMRC local authority-level statistics on self-employed people who do pay tax to get an overall self-employment figure. Apply the IFS-based SPI adjustment pre-2018/19 to reduce overcounting of the self-employed.
- **Estimate employees:** Take the number of PAYE employees from HMRC and, based on information from the SPI, subtract self-employed people who are also employees. Add in a small proportion from the APS that are employed in job types that are not captured by tax data (e.g., those working for family).
- **Estimate employment**: Add self-employment to employee counts to obtain a total employment figure for the 16+ population.

To get an estimate of employment for those of working age (16-64), we then use Census data to estimate and subtract those over 65 who work.

Figure A 1 summarises how the data are used to estimate employment, unemployment, and inactivity estimates.

Figure A 1: process of estimating employment, inactivity, and unemployment



Rates are calculated out of the relevant population count sourced either from the National Records of Scotland (NRS) or from our own estimates of the economically active population. Overall population figures differ from those used in weighting for both the LFS and the APS, which affects how our employment and inactivity rates compare to those derived from the survey data. This is discussed in more detail in the next section.

Our approach expands on previous work by the Resolution Foundation and a previous SHERU report [9], [10]. The differences are summarised in Table 1.

Table 1: Differences between this model and previous research

	This model	**Original SHERU model**	**Resolution Foundation model**
Geography	Local authorities in Scotland	Scotland	UK
Population data	NRS	LFS	LFS pre-2021; other ONS data post-2021
Adjustment for 65+ employment to get 16-64 estimates	2011 and 2022 Census-based employment rates among 65+	PAYE RTI by age, plus an assumption 10% of the self-employment volume is aged 65+	PAYE RTI by age, plus an assumption that the LFS proportion of self-employment that is 65+ is accurate
Adjustment for people who are both self-employed and employees	SPI data at Scotland level (as %)	Count from LFS	HMRC statistics
Adjustment for non-taxpaying self-employed people	SPI data at Scotland level (as %)	HMRC statistics; assumes UK % applies to Scotland	HMRC statistics

Estimating inactivity and unemployment

We estimate the inactivity count for each local authority by calculating:

$$inac_{LA} = (population_{LA} - emp_{LA}) \times \frac{inac_{LA}^{APS}}{inac_{LA}^{APS} + unemp_{LA}^{APS}}$$

The inactivity count takes the ratio of inactive to all non-working people from the APS and applies it to an estimate of the non-working population aged 16-64 (as calculated in the previous section).

An inactivity rate is than calculated as a percent of the NRS population for that local authority.

The population not in employment or inactive is then considered unemployed. The unemployment rate is calculated as a proportion of our estimated economically active population in each local authority.

These calculations are carried out for the 16+ and 16-64 age groups.

Estimating who wants to work

By definition, unemployment represents people who are searching for work and ready to start working in the next few weeks. However, a broader measure of people who want to work (either with barriers removed, or under the right conditions) may be useful for policymaking.

People who are unemployed want to work by definition, but those who are inactive may or may not want to move into work. We take a percentage from the APS of inactive people who want to work in each local authority and apply this to our estimate of inactivity. We then add that proportion of inactive people to the whole count of unemployed people to estimate how many people want to work.

Where local authority information on who among the inactive would like to work is missing, we use the Scotland-wide average. More information on this measure and what it looks like across Scotland can be found in the FAI report *Understanding local labour markets across Scotland*.

Explaining the difference between APS statistics and our modelled estimates

Population and employment counts

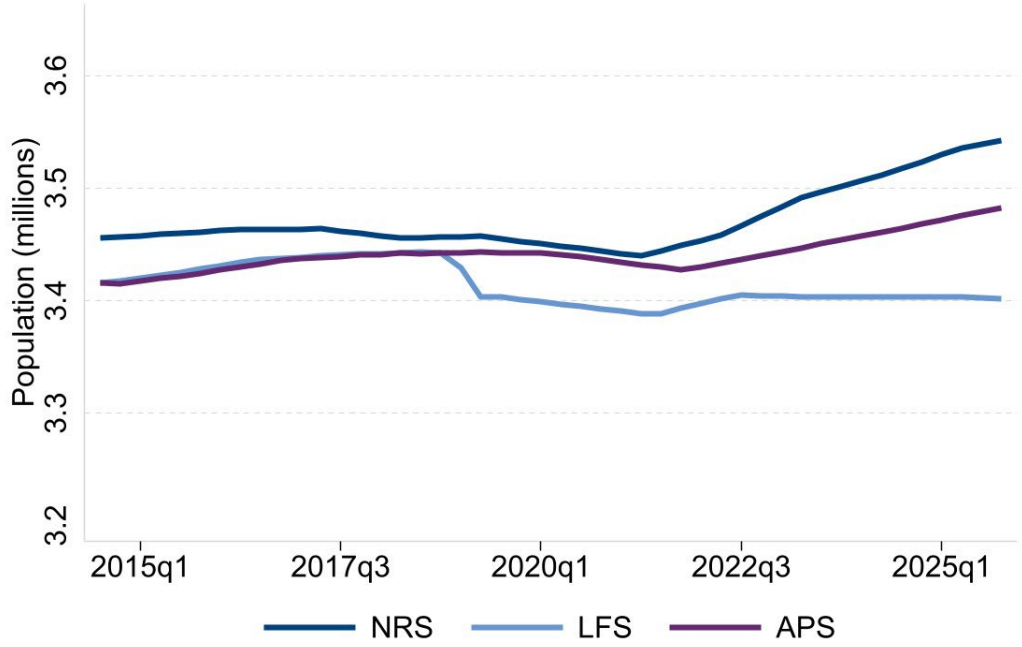
Our Scotland- and local authority-level estimates of inactivity, unemployment, and people who want to work are calculated by applying proportions from the APS to modelled employment counts and population estimates from the NRS. Divergence in our estimates compared to those from the LFS or APS alone must therefore come from either (or both) estimates of how many people are employed or how many working aged people there are in each local authority.[1]

The LFS and APS use grossing factors that are meant to result in a representative weighted sample. The grossing factors are designed to add up to the correct national and local authority populations [11], but in practice may not match closely, particularly when looking at specific areas or age groups.

At the Scotland level, the APS tends to understate the size of the 16-64 population (Figure A 2). Since a reweighting exercise in 2019, the LFS and APS do not have the same population sizes, and the LFS population sizes for Scotland are even lower.

[1] Note that the preferred data source for Scotland-level statistics is the LFS, while the APS is used for local authority-level statistics. We discuss both here.

Figure A 2: Population aged 16-64, Scotland, 2014-2025



Sources: NRS and Nomis
Notes: Annual NRS population estimates are smoothed by quarter.

Some of this is because the LFS and APS are not intended to cover the entire population; they exclude temporary foreign workers, those in the armed forces not living in private accommodation, and workers living in communal establishments.

The ONS publishes data for reconciling the UK Workforce Jobs[2] series with the number of jobs estimated from the LFS [3]. These adjustments are for jobs, not the overall population, but they indicate that the difference in the size of the population covered vs not covered by the LFS has not changed much since 2019. In contrast, we see a widening gap between the populations in the APS and LFS compared to the NRS population estimates from the beginning of 2022 onwards. Furthermore, it is difficult to believe that the number of people not covered by the LFS and APS in Scotland is as high as 60,000 (for the APS) or 140,000 (for the LFS) in 2025Q4 – equivalent to 2-4% of the working-age population.

The gap may be partially driven by the timing of APS reweighting. The last reweighting exercise was from July 2022 to December 2023. Data on high levels of net migration post-pandemic was not fully available and was likely not accounted for in the APS reweighting. In contrast, the NRS population estimates will have taken recent migration patterns more into account.

Unlike at the Scotland level, in some local authorities the APS overstates the population relative to that estimated by the NRS. For instance, the APS records a 16-64 population for Aberdeenshire that is 8% higher than the NRS data.

[2] Workforce Jobs is an ONS dataset that uses business surveys to measure employee jobs [12]. It is part of the suite of labour market indicators recommended by the ONS for evaluating the state of the labour market.

These population differences will drive part of the difference between inactivity and unemployment in the LFS or APS vs our modelled estimates. If the population in the LFS and APS is understated, all else equal, the published inactivity rate will be higher than our estimates.

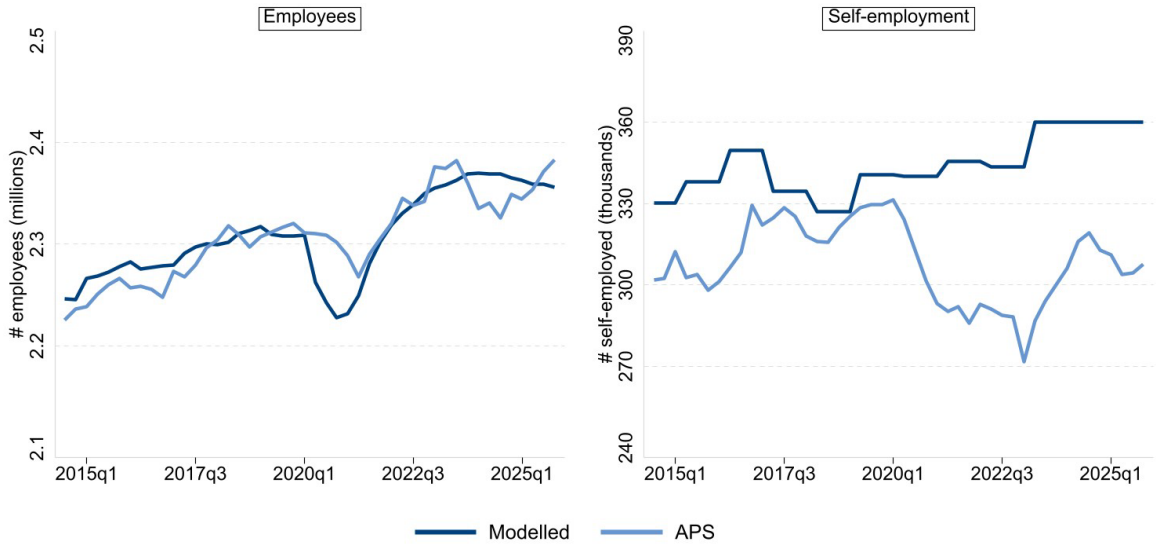
However, the LFS and APS also often have different grossed employment counts (aged 16-64) than our modelled estimates. The combination of differences in population and employment counts drives the difference in our employment rate estimates.

We decompose the difference between our estimated employment rate and that calculated from the APS[3] into differences driven by population estimates and by employment estimates. These vary a lot across time and local authorities (and can be negative, so are sometimes difficult to interpret).

On average, 57-58% of the difference in our estimated employment rate comes from different population estimates, and 42-43% comes from differences in employment counts.

The differences in employment counts are largely driven by the underlying administrative self-employment data (Figure A 3).

Figure A 3: Self-employed and employee counts, Scotland, 16+



Source: SHERU and Nomis

The administrative self-employment data show greater self-employment in nearly all quarters compared to the APS. In particular, where the APS shows a decline, then recovery (broadly) in self-employment during and just after the pandemic, the administrative data show largely steady self-employment.

One key reason for this is that the administrative data are from HMRC tax records, whereas the APS has self-reported employment status. In the latter, respondents identify the type of work they have

[3] The LFS is the more commonly used survey for Scotland-level headline labour market estimates, while the APS is used for local authority level estimates. While we refer to Scotland-level modelled data here, because the purpose of this report is to model local authority-level labour market data, we compare our modelled results to APS estimates.

done in the last week; some people who file tax as self-employed may work as such only intermittently and therefore would not be counted as self-employed in the APS. Additionally, some people may choose to focus their responses on a job they hold rather than talk about self-employment, which could also contribute to differences.

Furthermore, the tax records are for each tax year, whereas the APS tracks quarterly variation.

In contrast, prior to the pandemic, the APS employment figures for Scotland track reasonably closely with the administrative data. However, the pandemic decline in employment is not as pronounced, and data issues in 2023 and 2024 show a divergent trend in the two data sources.

Potential model extensions

There are various ways that this model could be extended, particularly using secure-access data from HMRC. Two potential extensions are described below. We are also interested in hearing others' thoughts in this area and would welcome correspondence.

Local authority-specific self-employment data adjustments

To obtain overall employment figures, we apply an adjustment for self-employed people who do not pay tax that is calculated at the Scotland level from SPI data. This adjustment factor could be obtained at the local authority level from the secure-access version of the SPI, which would improve the accuracy of the self-employment estimates at the local level.

Secondly, we adjust overall self-employment figures calculated from the SPI to account for a known issue with the survey weights prior to 2018-19. We have used an adjustment factor in each tax year that was calculated by the IFS for the UK overall [6]. This adjustment factor could likely also be obtained at the local authority level (or, failing that, for Scotland) through the HMRC Data Lab, which would improve the model's accuracy on self-employment.

Modelling reasons for inactivity

As discussed in the main report, employment trends are important for the design of employability and other local services and play a role in funding allocations across local authorities. However, for understanding the relationship between health inequality and employment status, trends in health-related inactivity are particularly important.

This project did not model reasons for inactivity, largely because there is no administrative data that directly measures inactivity, much less why people are inactive. However, it may be possible to use changes in measures related to different reasons for inactivity to estimate, for instance, changes in health-related inactivity. Potential data sources could include:

- Benefit caseload data for disability benefits (e.g., Adult Disability Payment) and the health element of Universal Credit – *Social Security Scotland and the Department for Work and Pensions*
- Employability service client data – *Scottish Government*
- Statistics on students in colleges and universities – *HESA*

- State Pension and Pension Credit claimant data – *Department for Work and Pensions*
- Census data on employment status by age, including retirement – *National Records for Scotland*
- Benefit caseload data for carer benefits (e.g., Carer Support Payment) – *Social Security Scotland*

Sources

[1] National Records of Scotland, 'Mid-2024 population estimates'. Edinburgh, Aug. 14, 2025. Accessed: Jan. 08, 2026. [Online]. Available: https://www.nrscotland.gov.uk/publications/mid-2024-population-estimates/

[2] National Records of Scotland, 'Subnational Population Projections: 2022-based'. Edinburgh, Sep. 30, 2025. Accessed: Oct. 29, 2025. [Online]. Available: https://www.nrscotland.gov.uk/publications/subnational-population-projections-2022-based/

[3] Office for National Statistics, 'X03: Reconciliation of estimates of employment and jobs'. Mar. 19, 2026. [Online]. Available: https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/reconciliationofestimatesofemploymentandjobsx03

[4] HM Revenue and Customs, 'Table 3.14 Income and tax by borough and district or unitary authority'. Apr. 29, 2026. Accessed: May 12, 2026. [Online]. Available: https://www.gov.uk/government/statistics/income-and-tax-by-borough-and-district-or-unitary-authority-2010-to-2011

[5] HM Revenue and Customs, 'Survey of Personal Incomes'. UK Data Service, https://ukdataservice.ac.uk/, 2019. doi: http://doi.org/10.5255/UKDA-Series-2000117.

[6] I. Delestre, B. Jacobs-Strom, H. Miller, and K. Smith, 'New trends in self-employment and top incomes', Institute for Fiscal Studies, London, Report, Oct. 2025. Accessed: Apr. 20, 2026. [Online]. Available: https://ifs.org.uk/publications/new-trends-self-employment-and-top-incomes

[7] National Records of Scotland, 'Scotland's Census 2011'. National Records of Scotland, Edinburgh, 2011. Accessed: Jan. 20, 2026. [Online]. Available: https://www.scotlandscensus.gov.uk

[8] National Records of Scotland, 'Scotland's Census 2022'. National Records of Scotland, Edinburgh, 2022. Accessed: Jan. 08, 2026. [Online]. Available: https://www.scotlandscensus.gov.uk

[9] A. Catalano, 'A new model for economic inactivity in Scotland: Replicating alternative labour market projections', Scottish Health Equity Research Unit, Glasgow, Feb. 2025. [Online]. Available: https://scothealthequity.org/a-new-model-for-economic-inactivity/

[10] A. Corlett, 'Get Britain's Stats Working', Resolution Foundation, London, Briefing Note, Nov. 2024. Accessed: Jan. 06, 2025. [Online]. Available: https://www.resolutionfoundation.org/publications/get-britains-stats-working/

[11] Office for National Statistics, 'Labour Force Survey User Guide Vol. 1 - LFS background and methodology', Office for National Statistics, 2024. Accessed: May 13, 2026. [Online]. Available: https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/methodologies/labourforcesurveyuserguidance

[12] Office for National Statistics, 'Labour market overview, UK: April 2026', Office for National Statistics, Apr. 2026. Accessed: May 15, 2026. [Online]. Available: https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/uklabourmarket/latest