Labour Productivity Statistics

Methodology Guide

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Introduction

The Labour Productivity Statistics published by the Scottish Government contain official statistics on labour productivity in Scotland for the whole economy and experimental statistics on labour productivity for broad industry groups. Labour productivity is defined as the amount of economic output that is produced, on average, per unit of labour input and is an important indicator of economic performance.

The results are presented in both real terms (inflation adjusted) and current prices (nominal, not adjusted for inflation). The main use of current price productivity statistics is to make comparisons between countries or regions at a particular point in time, whereas real terms productivity statistics are used to analyse changes in the level of activity within a particular country or region, or to compare growth rates between countries or regions.

Labour productivity statistics are derived by dividing measures of output by some measure of labour input. As such, their quality and accuracy are therefore dependent on the quality of the source data. The output measures used in the productivity statistics for Scotland are nominal Gross Value Added (GVA) taken from Quarterly National Accounts Scotland (QNAS) and real terms GVA taken from Gross Domestic Product for Scotland. Labour input measures (number of jobs filled and number of hours worked) are consistent with the quarterly NUTS1 results for countries and regions published by the Office for National Statistics (ONS).

How the Output is Created

Labour input is measured by number of jobs filled and hours worked. Total Productivity Jobs (PJ) and Productivity Hours (PH) for Scotland are calculated quarterly by ONS. The Scottish Government is now producing quarterly estimates of whole economy labour productivity in Scotland as well as experimental breakdowns of PJ and PH by industry, constrained to the ONS totals, published on an annual basis.

The methods used for these breakdowns are designed to be broadly consistent with the methods used for the UK national totals[1] whilst making practical allowances for the lower sample sizes at NUTS1 level. The methods are designed to be generally applicable to all NUTS1 regions, although in practice this may not be feasible due to differing Labour Force Survey sample rates between areas. The measure for Productivity Jobs is derived by summing the numbers of employees (EE), the self-employed (SE) and two smaller components, Her Majesty's Forces (HMF) and Government Supported Trainees (GST).

[1] https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/labourproductivity/qmis/labourproductivityqmi

These data come from three principle sources; the Labour Force Survey (LFS), the Business Resister and Employment Survey (BRES) and ONS Regional Workforce Jobs (WFJ). Productivity hours are derived from estimates of average actual hours worked (established using LFS microdata) and Productivity Jobs.

Output per Job Estimates

While LFS is considered to be the preferred source of total number of employee jobs, BRES provides a more reliable industry breakdown of labour input. For the purposes of estimating productivity, the employee jobs from BRES are classified by the industry of their business reporting unit (RU). This differs from the employee jobs component of Workforce Jobs, where employees are classified by the activity of their local unit (LU) or branch. This RU classification is to achieve consistency with the measurement of output being used. The employee jobs series is added to the self-employed, HM forces and GST series to create a total jobs series which is then scaled to the quarterly ONS total Productivity Jobs for Scotland. The components of the productivity jobs series are summed by industry as shown in the equation below:

$$PJ_{NUTS1} = ONS\ PJ\ Constraint\ x \left\{ \left([LFS\ Constraint]_{Total\ EE}\ x\ [EE\ jobs_{BRES:\ RU}]_{by\ industry} \right) + [SE\ jobs_{LFS}]_{\ by\ industry} + [HMF\ jobs_{WFJ}]_{by\ industry} + [GST\ jobs_{WFJ}]_{by\ industry} \right\}$$

NOTE:

1. *Industry T employee jobs are sourced from WFJ*
2. *BRES total employee jobs are scaled to match LFS total employee jobs at NUTS1.*
3. *ONS NUTS1 WFJ statistics are used for HMF and GST due to small samples in LFS.*

At the whole economy level and selected broad industrial groups GVA is divided by the jobs based labour input series to derive the total output per job productivity series.

Output per Job Estimates

To produce estimates of output per hour by industry, an input labour series based on the total actual hours worked is required. An employee hours and GST hours series is created by multiplying the productivity jobs series by average weekly hours worked, recorded by the LFS. HM Forces data are created in a similar way, however a fixed working week is used. Self-employed total hours data come directly for the LFS. The components of the productivity hours series are summed by industry as shown in the equation below and then scaled to the quarterly ONS total Productivity Hours for Scotland.

$$PH_{NUS1} = ONS\ PH\ Constraint\ x \left\{ \left(\left[Avgwkhrs_{LFS:EJ} \right]_{by\ industry}\ x\ [EE\ Productivity\ Jobs]_{by\ industry} \right) + [LFS\ hours_{SE}]_{\ by\ industry} + (35\ fixed\ hours\ x\ [WFJ_{HMF}]_{by\ industry}) + ([Avgwkhrs_{LFS:GST}]_{Total}\ x\ [WFJ_{GST}]_{by\ industry}) \right\}$$

At the whole economy level and selected broad industrial groups GVA is divided by the jobs based labour input series to derive the total output per job productivity series.

Time Series

In the current results, quarterly estimates of whole economy labour productivity from 1998 onwards are published as official statistics. The labour input series used in the production of these statistics are benchmarked to ONS quarterly non-seasonally adjusted productivity jobs and hours. Seasonal adjustment is then applied to the labour input series using the X-12 ARIMA method to remove regular seasonal peaks and troughs and to ensure the underlying trends and other features of the data are easier to identify.

Annual estimates of labour productivity for broad industrial groupings were originally made available for 2009-onwards, reflecting the availability of BRES data using SIC 2007. In the most recent results these series have been extended back to 1998 in line with whole economy labour productivity statistics.

All labour input data have been processed back to 1998 using SIC conversions from SIC 1992 and SIC 2003 to SIC 2007, and have been adjusted by the Scottish Government to account for industrial classification changes consistent with national accounts Supply and Use Tables.

The employee jobs series has been processed using data from the Annual Business Inquiry part 1 (ABI/1) for years 1998-2008 and BRES data from 2009 onwards. The combined ABI/BRES series provides an annual constraint to employee jobs from which quarterly estimates are calculated based on movements in employee jobs from NUTS1 WFJ. Provisional estimates for the latest year (for which BRES data are not yet available) are based on movements in the quarterly NUTS1 WFJ series.

Any quarter on quarter changes in Labour Productivity should be interpreted with caution, not least due to difficulties in ensuring consistency of seasonal adjustment between the output measure (numerator) and the labour input measure (denominator).

Feedback

The estimates of labour productivity for broad industry groups are currently classified as experimental statistics, which are defined in the Code of Practice for Official Statistics as new official statistics undergoing evaluation. The results and methodology are published in order to involve users and stakeholders in their development at an early stage.

The methods used to produce estimates of how much total labour input is allocated between industry sectors is undergoing development and users should be aware that the published results may be revised in future releases. Additionally, other approaches of disaggregating whole economy labour productivity are currently being discussed with the Labour Productivity Team at ONS.

Any additional statistics developed as part of this programme are likely to be designated as experimental official statistics and consulted on with users and other stakeholders. Users will be kept up to date with developments through the ScotStat register and in meetings of the Scottish Economic Statistics Consultation Group.

If you have any feedback on these industry labour productivity statistics, please contact the Scottish National Accounts Programme team at economic.statistics@gov.scot.