Addendum to Intuit QuickBooks Small Business Index: A New Employment Series for the US, Canada, and the UK

Ufuk Akcigit Raman Chhina Seyit Cilasun Javier Miranda Eren

Ocakverdi Nicolas Serrano-Velarde

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New employment series for the UK focuses on jobs growth

Since the Intuit QuickBooks Small Business Index was launched in March 2023, the UK methodology has relied on official job vacancy statistics from the UK Office of National Statistics (ONS) Vacancy Survey for firms with between 1 and 9 employees.[1] As discussed in Akcigit et al (2023) we used these data in the absence of an updated job creation and destruction series from administrative data, which are available in the US. In the UK, the vacancy estimates are available monthly and are produced based on a seasonally adjusted, three-month moving average. Published by the ONS, the series has national statistics status. Vacancy estimates cover the whole economy, excluding agriculture, forestry, and fishing. We used these estimates in our initial calibration exercise but acknowledged our intent to move to a methodology which more closely aligns with our target employment series and what's already published each month in the US and Canada. With this in mind, we now produce a new small business employment series for the UK based on the ONS Business Population Estimates, which we describe next.

ONS Business Population Estimates

For the new employment-based UK QuickBooks Index, we make use of the Business Population Estimates (BPE) from the ONS. This is the only official source for data on the total number of enterprises in the UK and their associated turnover and employment.[2] An important strength of the BPE data for our purposes is that it provides estimates of the total number of private sector businesses in the UK at the start of each year, including both registered and unregistered businesses. The data comes from three main sources: the ONS Inter-Departmental Business Register (IDBR), the ONS Labour Force Survey, and HMRC self-assessment tax returns.[3] The BPE provides further breakdowns of businesses by number of employees, legal status, industry, and geography. Included in the size breakdown are businesses with between 1 and 9 employees which we use to construct our sample

[1] See Akcigit et al, 2023. Intuit QuickBooks Small Business Index: A New Employment Series for the US, Canada, and the UK. https://www.nber.org/system/files/working_papers/w31350/w31350.pdf. Data can be found at https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/jobsandvacanciesintheuk/latest

[2] See Methodology and Quality Note 2022 - GOV.UK https://assets.publishing.service.gov.uk/media/6322ef738fa8f5779387cd50/BPE_METHODOLOGY___QUALITY_NOTE_2022.pdf

[3] The IDBR covers VAT and/or PAYE registered enterprises, while the BPE supplements this with estimates of unregistered businesses based on the Labour Force Survey and HMRC data.

weights. It differs from other ONS publications like business activity, size, and location which only cover VAT or PAYE registered enterprises.[4]

Methodology

The UK employment methodology does not target an official job growth series as is the case in the US. Instead, we developed a simplified approach that directly reweighs the Intuit sample to ensure it is representative of the population of small businesses (with 1-9 employees) in the UK. This simpler methodology is not benchmarked against an official series (and should therefore be considered an independent series) but it has the strength of producing an employment index rather than a vacancy index and is thus closer in spirit to our initial intent.[5]

We start by producing seasonally adjusted gross job expansions and gross contractions using the X-13-ARIMA SEATS program for each region and sector in the UK sample of QuickBooks Online Payroll customer data (QBO). For this, we create region and sector cells as defined in the BPE data. We exclude entry and exit from this series since this is highly volatile in the QBO UK sample and leads to noisy results. We seasonally adjust the total employment series. We compute net growth rates for each cell using the seasonally adjusted series. The additive properties of each series are maintained by adding the seasonally adjusted expansion and contraction components when creating the net growth series.

Our intent is to construct a nationally representative net growth series for small businesses in the UK by constructing a series using appropriate industry times region cells weights. To construct the weights, we calculate the employment shares for cells including 12 regions, 13 sectors, and year interactions in the QBO sample and BPE (official data).[6] We then calculate region-sector weights as the ratio of the BPE to QBO shares (S) of establishments (E) as follows:

$$W^{srt} = \frac{S^{srt}_{BPE}}{S^{srt}_{QBO}} = \frac{E^{srt}_{BPE}/E_{BPE}}{E^{srt}_{QBO}/E_{QBO}},$$

where *s*, *r*, and *t*, denote sector, region, and year. The BPE are produced annually we update the weights only once per year. Ideally, we would like to update the weights at higher frequencies, but since this is the only data available and the shares of activity don't change dramatically from year to year we proceed with this approach.

The BPE tabulations include detailed size (including 1-9 employees), by industry and region cells. Some of the cells are scarcely populated leading to potentially noisy estimates in some industry times region combinations. To avoid this, we replace low-sample region-sector combinations (cells with fewer than 30 observations in the QBO using the following 2-step procedure:

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[4] See UK business; activity, size and location statistical bulletins, ONS. https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/bulletins/ukbusinessactivitysizeandlocation/previousReleases

[5] This type of reweighting methodology is used to create other indices like the ADP National Employment report – ADP® Employment Report (adpemploymentreport.com).

[6] The 12 regions include 3 nations and the 9 regions of England.The 13 sectors, excluding: sector A "Agriculture, Forestry and Fishing"; sectors B, D and E "Mining and Quarrying; Electricity, Gas, Steam and Air Conditioning Supply; Water Supply; Sewerage, Waste Management and Remediation Activities"; and sector S "Other Service Activities. We exclude "Electricity, gas, steam and air conditioning supply; Water supply; sewerage, waste management and remediation activities" due to it not being covered in BPE's sector breakdown and Section B, "Mining and Quarrying" due to low sample size in QBO.

1. If the region-sector has a sample including at least 30 observations a given year but not for previous years, then we replace the weight from those low-sample size years with the latest year that has >=30 observations.
2. Otherwise, replace the region-sector weight with the overall national sector mean. Note we thus assume that the industry distribution follows the national average.[7]

Using the region-sector weights above, we then create a national net growth series as the weighted average of the industry times region net growth series as follows:

$$G^{t}_{w} = \sum_{sr} W^{srt} S^{srt}_{QBO} G^{srt}$$

We compute region as well as sector specific series using equivalent weights for industry, and for region. We are not including region-sector in the employment index.

Net growth reweighing

The Index methodology calcualtions produce a discrepancy in the total net employment growth between the national series and the aggregated regional or industry series. As described below, we now employ a statistical reweighting of the growth rate estimates for the regional and industry series to correct this discrepancy and align with the national data.

Our methodology generates a growth rate series — for the US, CA, and UK as a whole, or by industry, and region.[8] From these rates, we produce actual employment numbers in levels and changes. Discrepancies in the total net employment growth between the national series and the aggregated industry or regional series can arise. These discrepancies are the result of statistical and rounding errors in the industry and regional growth rate series.[9] To ensure the sub-national series align fully with the national series we recenter the growth rate estimates for the regional and industry series so that the sum of the implied employment growth from these series equals the national total. More formally, note that the sum of net employment growth across regions or industries, N_r, need not equal the national totals, N, at time t, or $N_t \neq \sum_r N_{rt}$. To ensure the equality is restored we reweight the industry or region cells using the following weights:

$$W_{rt} = N_{rt} / \sum_r N_{rt}$$

Using these weights, we distribute the national net growth to each region and sector so that the sum of new net employment growth across regions or industries, $\widehat{N}_{rt}$, equals the national net change, or $N_t = \sum_r \widehat{N}_{rt}$:

[7] We took this step because fluctuations in low population cells generate considerable volatility in the estimates.
[8] Region in the US refers to regions and states, and in the UK to nations and regions.
[9] Employment is recovered by multiplying the growth rate by the base level employment.

$$\widehat{N}_{rt} = N_t * W_{rt}$$

The implied levels for each region and sector in the current period, E_{rt}, are adjusted, $\widehat{E}_{rt}$, to reflect the reweighted net growth:

$$\widehat{E}_{rt} = E_{rt-1} + \widehat{N}_{rt}$$

Finally, the net growth rates for the current period, G_{rt}, are adjusted, $\widehat{G}_{rt}$, to reflect the reweighted net growth:

$$\widehat{G}_{rt} = \frac{\widehat{E}_{rt} - E_{rt-t}}{.5*(\widehat{E}_{rt} + E_{rt-1})}$$