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

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# Motivation

- Small and young businesses play an important role in economic activity
  - High growth: Have disproportional impact on job creation, innovation, and economic growth
  - Lifestyle: Employ 10% of US workforce
- Small and young businesses are very sensitive to economic conditions and highly sensitive to business cycle and monetary shocks
  - Early indicator of economic activity!
- Data on the performance of small business from administrative datasets lags considerably (BED)
  - Survey data is more timely but small firm samples are small and noisy ➡ focus on economy-wide statistics (CES)
  - Small business sentiment surveys useful but not quantitative (e.g. check new Census-BTOS)
  - Continued efforts by FRB and other institutions to create timely indicators of economic activity including for small business
    - largely looking at employment
    - E.g. FRB-ADP

Smallest of small business activity is not well covered!

# Question

- Can we create a monthly indicator of small**est** business activity that is near real time?

- Keys:
  - Very large sample of small businesses
  - Real time activity
  - Industry and geographic detail

# Question

- Can we identify early impacts of policies? (another day)

- Keys:
  - Very large sample of small businesses
  - Real time activity
  - Industry and geographic detail
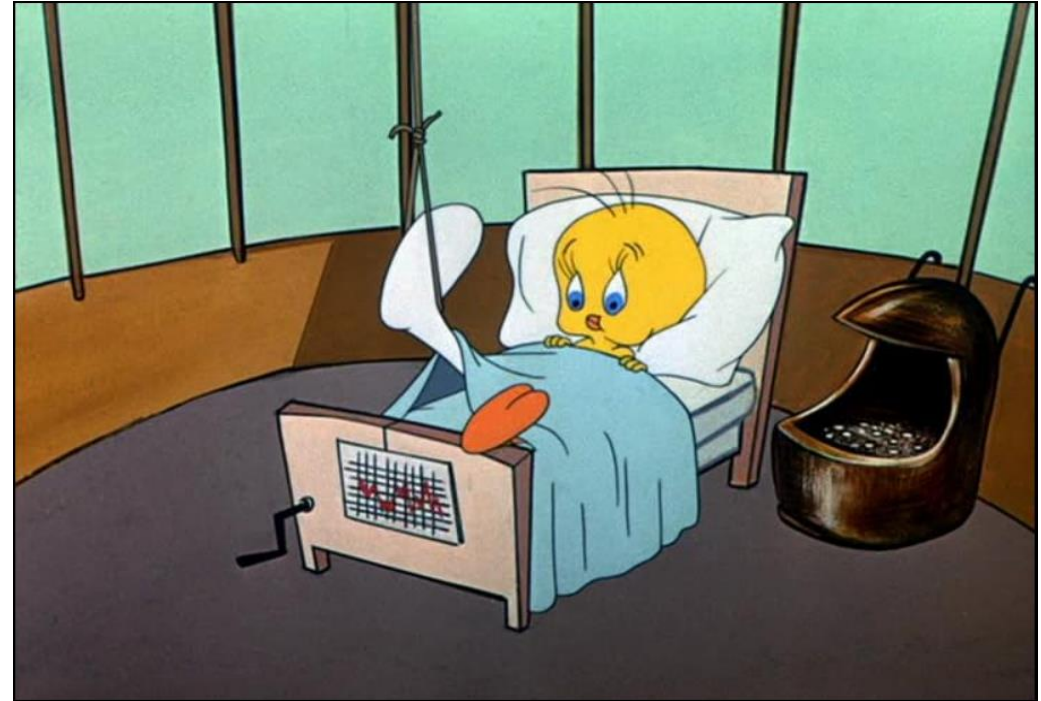
# Data: Intuit QuickBooks Small Business

- Large global financial technology platform (Intuit)
- Sample of QuickBooks Online Payroll subscribers (QBO Payroll sample)
  - Strengths
    - Focus on small business: Over 330,000 US firms in the 1-9 size class
    - Administrative data => ready by COM
      - long-id, payroll date, employees, hours wkd, gross pay, taxes, bonuses, subscription join/cancel…
      - Track expansion/contraction/entry/exit
    - Coverage: Broad geography/industry
    - Available also for other countries
  - Challenges
    - Biased in unknown ways (unstructured)
    - Very large platform growth
    - Entry/Exit => Platform use concepts
      - Large seasonal component tied to use

# Data: Intuit QuickBooks Small Business

| | |
|---|---|
| I don't know | 50% |
| Less than $5,000 | 23% |
| $5,000–$49,999 | 26% |
| $50,000–$99,999 | 47% |
| $100,000–$499,999 | 57% |
| $500,000–$999,999 | 63% |
| $1 million–$5 million | 78% |
| More than $5 million | 77% |

Percentage of respondents by Revenue bin which selected "Accounting Software or App" as an answer to "Which of the following does the business use to manage and/or record its financial transactions?

Source: QuickBooks Small Business Survey

FIGURE 9: SOFTWARE USAGE BY REVENUE

| | |
|---|---|
| High School or Less | 42% |
| High School to College | 51% |
| Bachelors | 60% |
| Graduate School | 56% |

Percentage of respondents by Education which selected "Accounting Software or App" as an answer to "Which of the following does the business use to manage and/or record its financial transactions?

Source: QuickBooks Small Business Survey

FIGURE 12: ACCOUNTING SOFTWARE USE BY OWNER EDUCATION
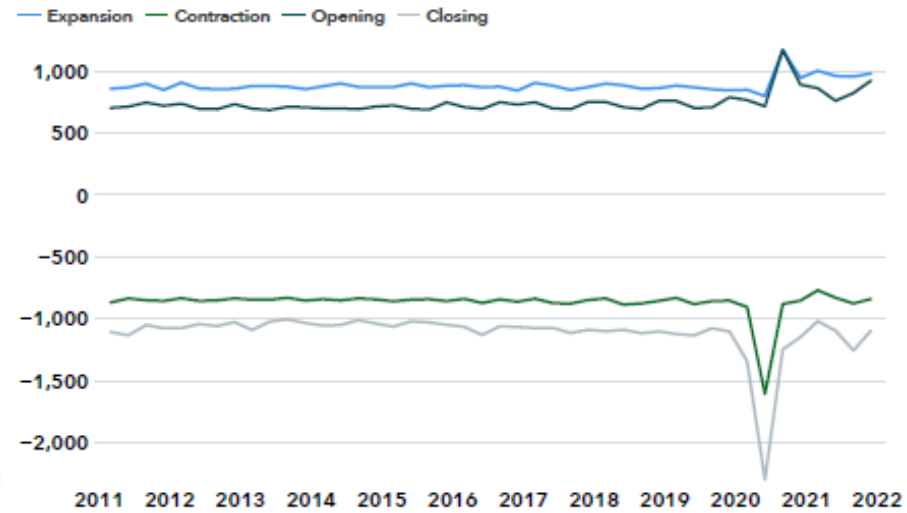
# Data: Intuit QuickBooks Small Business
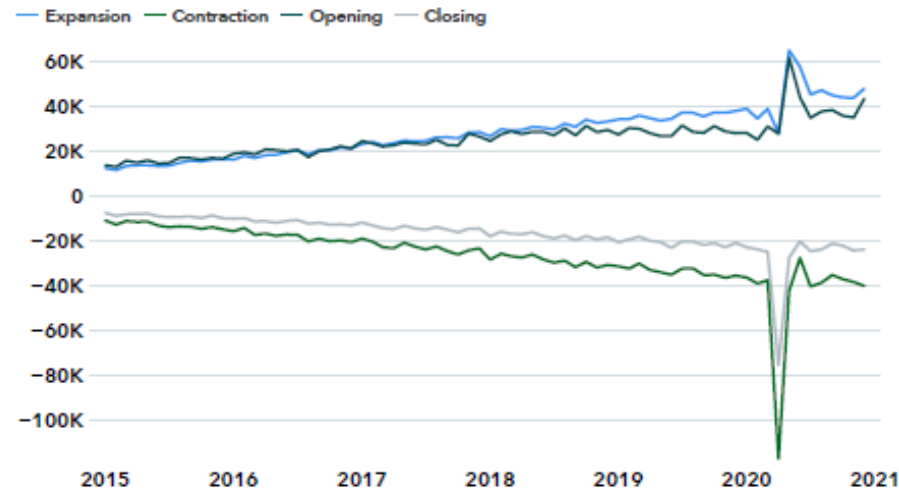


Firms Size 1-9, US. Note: Data points post December-2021 are used, but not shown in the figure to comply with confidentiality requirements.

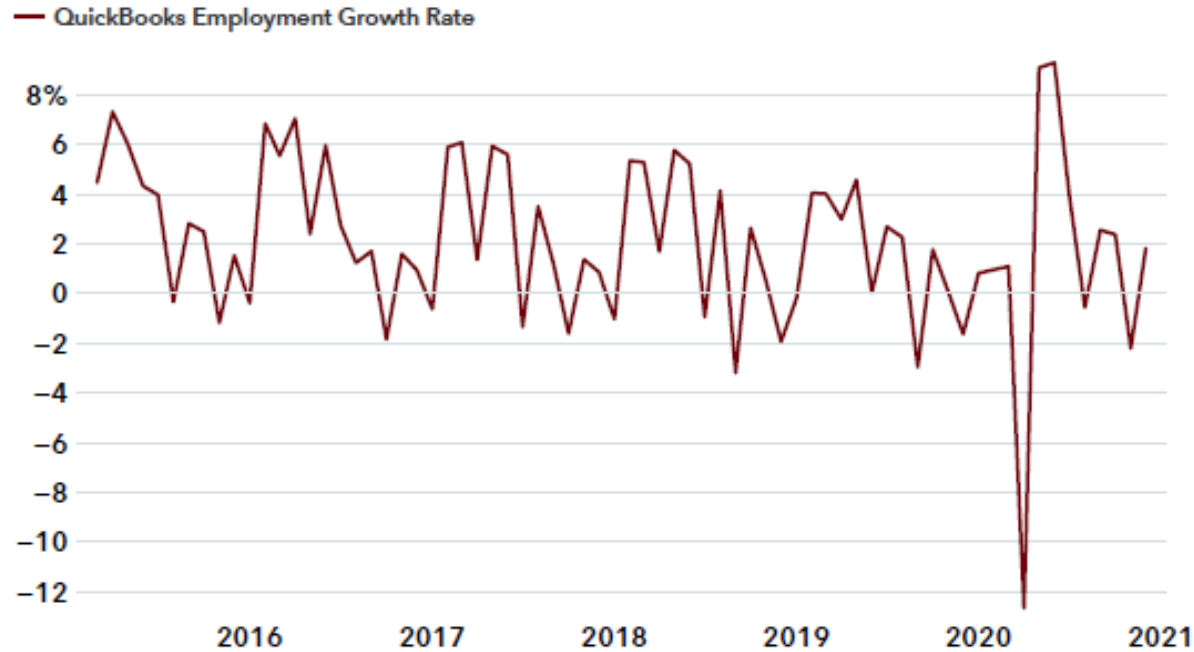Source: Seasonally Adjusted QuickBooks Online Payroll Sample.

Employment gains (000's) for size class 1-9

Source: Business Employment Dynamics

FIGURE 20: SEASONALLY ADJUSTED GROWTH MARGINS, QUICKBOOKS SIZE CLASS 1 TO 9 (LEVELS.)

FIGURE 21: SEASONALLY ADJUSTED GROWTH MARGINS, BED, SIZE CLASS 1 TO 9 (LEVELS.)

# Data: Intuit QuickBooks Small Business



Note: Data points post-December 2021 are used, but not shown in the figure to comply with confidentiality requirements.

Source: QuickBooks Online Payroll Sample

FIGURE 14: OVERALL GROWTH RATE, $g_t^{\text{OVERALL}}$

# Methods (U.S.)

- Goal: Extract signal and benchmark net growth rate against official statistics
  - Assumption: relationship between official statistics and QB does not change rapidly => Users respond to shocks in similar ways (after adjustments for growth and seasonality)
- Challenge: No readily available monthly benchmark series!

- Steps:
  - QB Data selection (QBO Payroll, active workers, non furloughed)
  - Seasonal adjustment
  - Modelling:
    - Creation of monthly benchmark series
    - Selection of adjustment factors (to adjust the levels)

# Methods (U.S.)

- QB Data selection
  - QBO Payroll, active workers, non furloughed
- Seasonal adjustment
  - X-13-ARIMA SEATS program (BLS)
  - Separately on different creation/destruction margins (important)
  - Seasonal adjustment of levels then converted to rates (total sa emp series)
  - Additive properties: Net is sum of gross gains and losses in rates
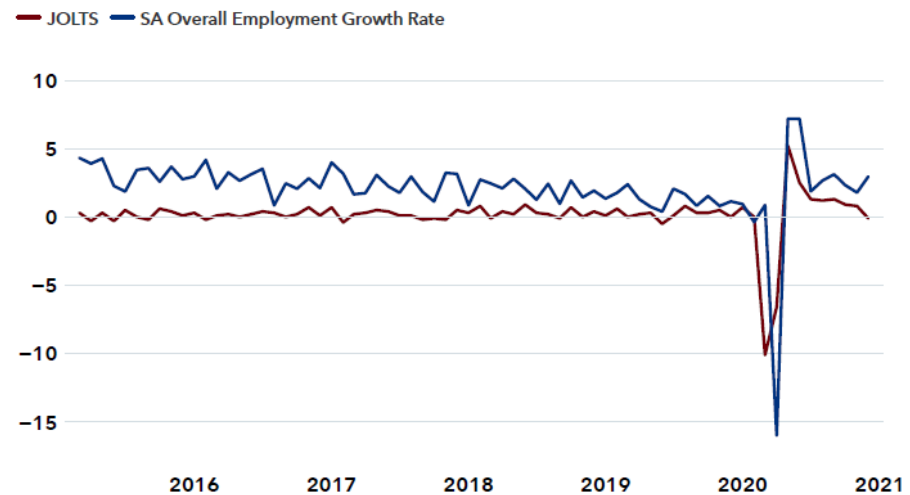
# Seasonally Adjusted Series vs Actual vs JOLTS
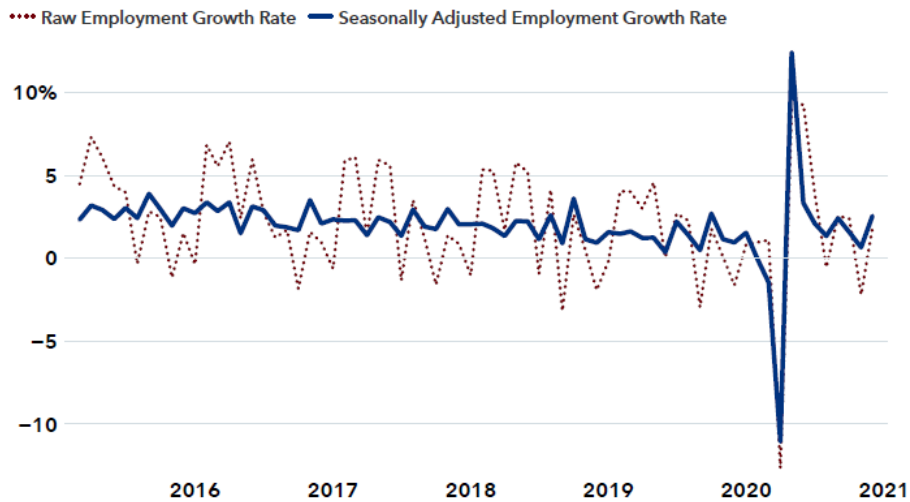


**Raw Employment Growth Rate** ···· **Seasonally Adjusted Employment Growth Rate** ──

Note: Data points post-December 2021 are used, but not shown in the figure to comply with confidentiality requirements.
Source: QuickBooks Online Payroll Sample.

FIGURE 22: SEASONALLY ADJUSTED NET JOB GAINS



**JOLTS** ── **SA Overall Employment Growth Rate** ──

Note: Data points post-December 2021 are used, but not shown in the figure to comply with confidentiality requirements.
Source: QuickBooks Online Payroll Sample and JOLTS Survey. Firms Size 1-9 Employees.

FIGURE 27: QUICKBOOKS SEASONALLY-ADJUSTED OVERALL VS. JOLTS

# Methods (U.S.): Modelling data I

- Creation of a monthly benchmark series
  - BED (Quarterly) => Gold Standard
  - JOLTS (Monthly) => Survey (more timely but biased for small firms, not fully comparable concepts)

- IDEA: Use BED to discipline JOLTS series
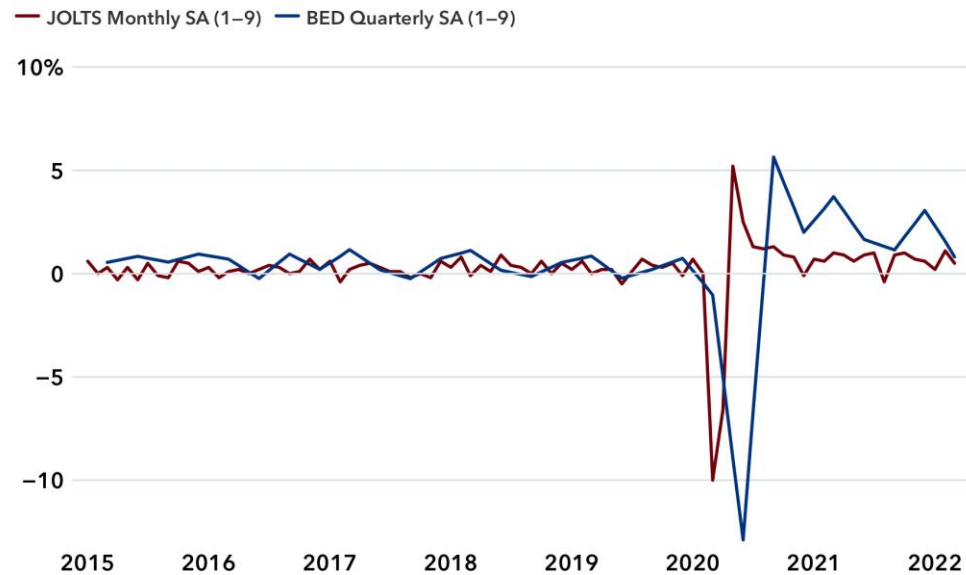  - Use Chow & Lin (1971) for frequency conversion

$$y_{j,t}^{BED,\,m} = \beta_j * y_{j,t}^{JOLTS,\,m} + u_{j,t}$$

$$u_{j,t} = \rho_j * u_{j,t-1} + e_t, \quad 0 \leq \rho_j < 1, \quad e_t \sim IID(0,\sigma)$$

$$y_{j,t}^{BED,\,q} = \sum_{s=0}^{r-1} y_{j,t-s}^{BED,\,m}, \quad t = r,\ 3r,\ 6r,\ \ldots$$

# BED-JOLTS Composite (BJC) series

- JOLTS vs BED

- interpolated monthly frequency
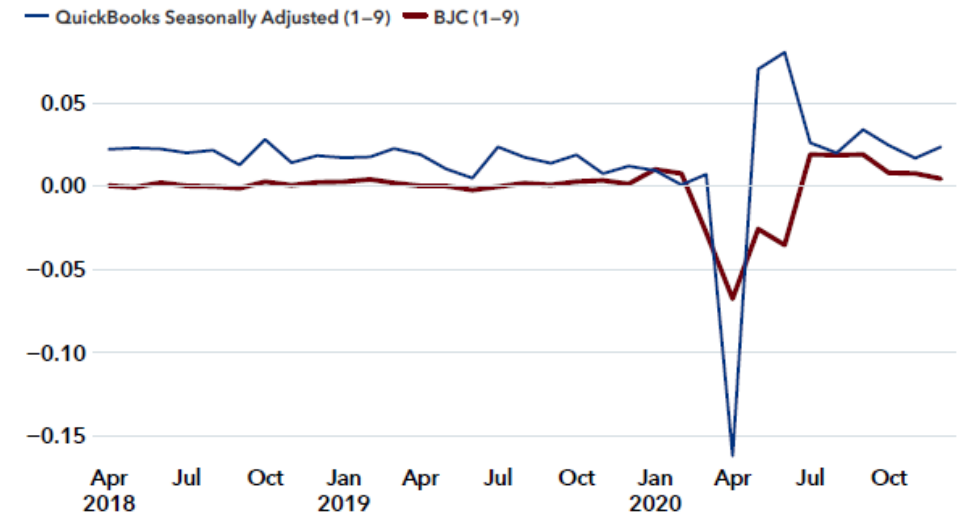


FIGURE 33: QUARTERLY BED VS MONTHLY JOLTS, NET JOB CREATION RATE, SA, PERCENT



FIGURE 35: QUICKBOOKS OVERALL AND BED-JOLTS COMPOSITE (BJC)

# Methods (U.S.): Modelling data II

- Creating adjustment factors: Flexible Least Squares (Kalaba and Tesfatsion (1989))
  - Model the relationship between BJC and Intuit series
  - Allow previous observations to come into the model
    - We can give different weight to different observations (more current)
  - Allows the parameters of the model to change over time
    - Specially important given platform growth and during shocks

$$\underset{\beta_{j,t} \in \mathbf{B_t}}{\text{argmin}} \, R(\mathbf{B_t}) = \sum_{t=1}^{T} \left( y_t^{BED, \, m} - \beta_{0t} - \sum_{j=0}^{q} y_{t-j}^{INTUIT, \, m} \beta_{j+1,t} \right)^2 + \lambda \sum_{t=1}^{T} \sum_{j=0}^{q} d_j * \left( \beta_{j+1,t} - \beta_{j+1,t-1} \right)^2$$
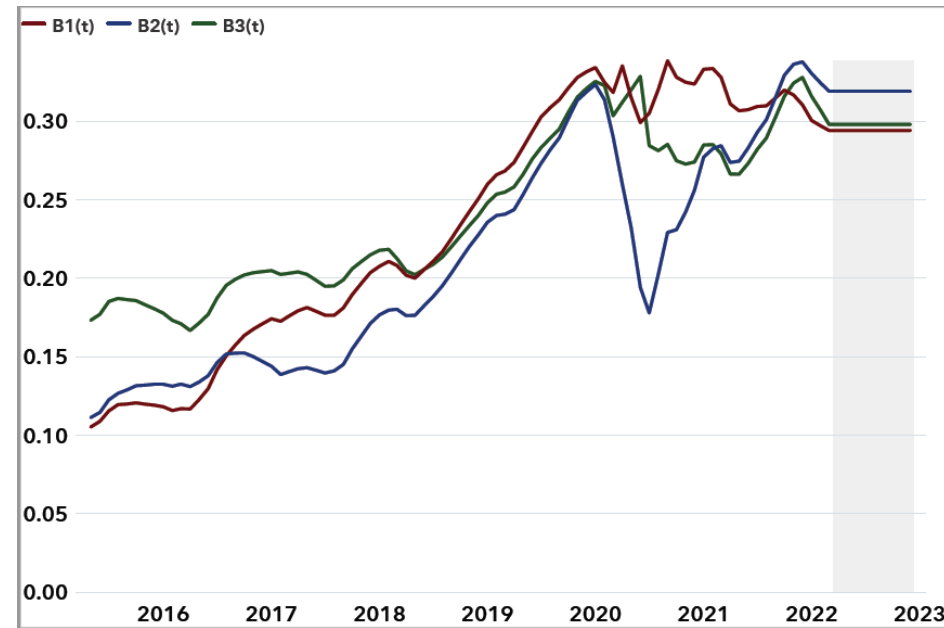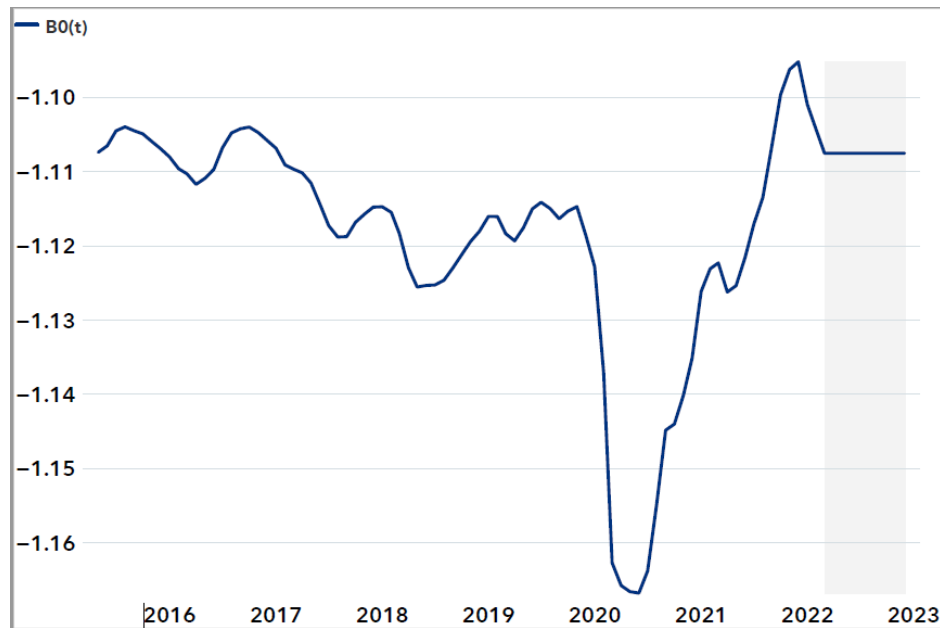
where,

$$d_j = \sum_{t=1}^{T} \left( y_{t-j}^{INTUIT,m} \right)^2.$$

- Steps:
  - Identify optimal lag structure and weights (use LASSO regression)
  - Parameter tuning for out-of-sample performance

# Methods (U.S.): Modelling data II
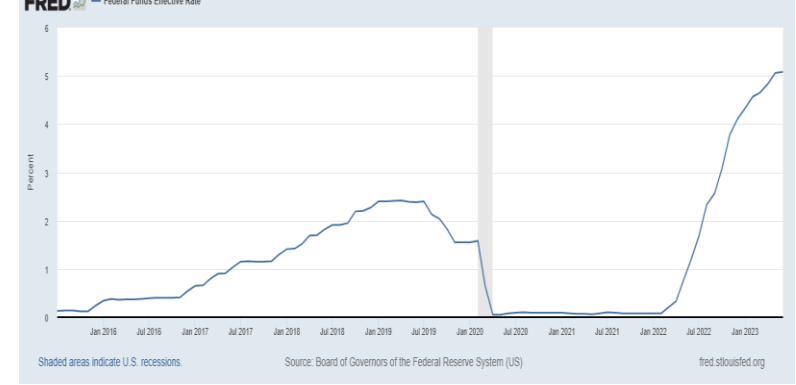
- Graphical intuition



- Steps:
  - Identify optimal lag structure and weights (use LASSO regression)
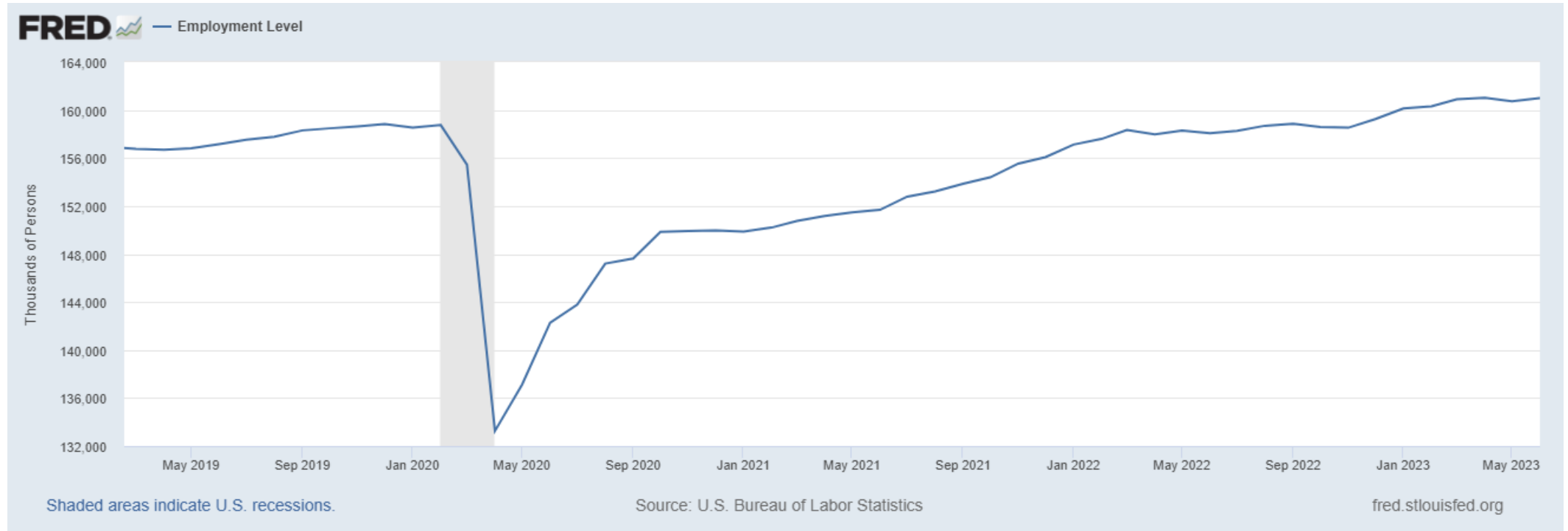  - Parameter tuning for out-of-sample performance

# Results



**Intuit QuickBooks Small Business Index**

USA | Total Employment | Businesses with 1-9 Employees

Jun '23
12,886,500

# Results



Source: Bureau of Labor Statistics, Current Employment Statistics (CES)

# Next Steps

- Monitor performance and make adjustments as needed
- Analyze information content of new series beyond what is available already
- Develop additional series:
  - Job Flows: Reallocation, Creation, and Destruction
- Other relevant metrics:
  - Sales, Inventories, outstanding invoice, contract work, ….
- QB: No information on business motivation or owner demographics
  - Future (?)
  - Enhanced with surveys
- Research:
  - Explore impact of monetary shocks
  - Drivers/impact of Technology adoption and use (marketing or field experiments)
  - …
- Engage with NSO for potential improvements

# Conclusion

- Successfully launched a new small business data series tracking the smallest of small business for US, Canada, UK: fills a data gap

- Benchmarked against official statistics

- Using a powerful methodology to get around sample bias and composition

- Raises interesting questions about policy and impact on small business

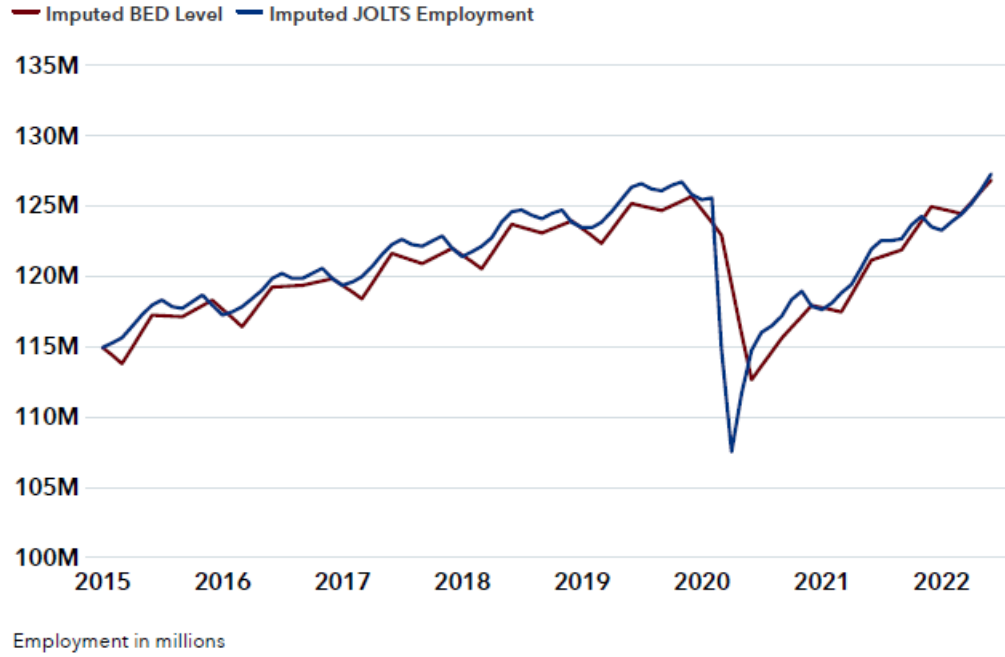- Excited about next steps...

Thanks!

# Additional slides

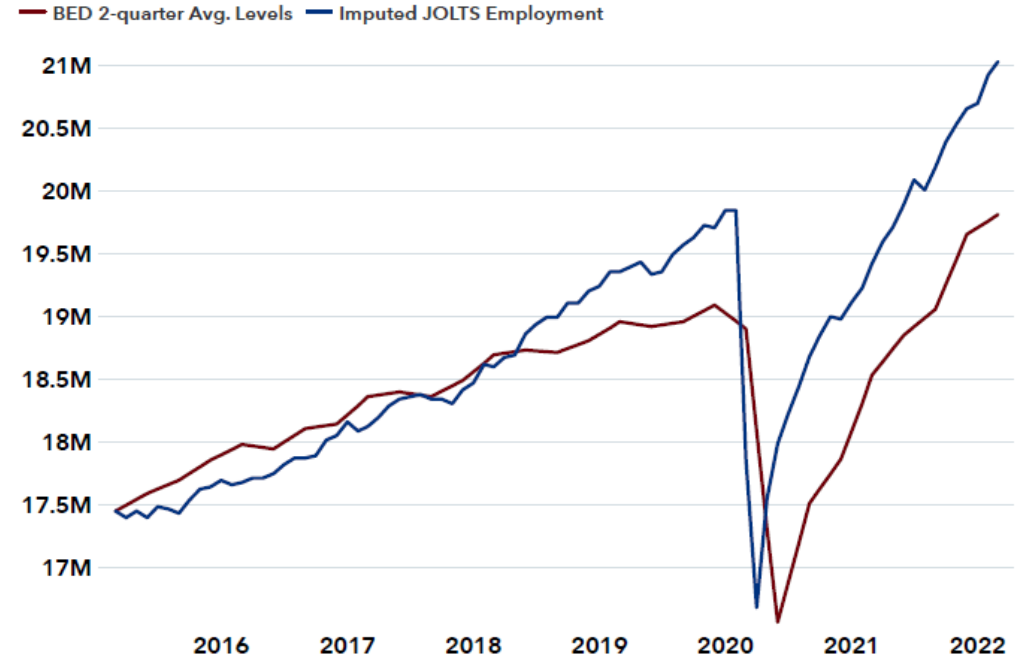FIGURE 29: TOTAL EMPLOYMENT: JOLTS/BED*, NATION



FIGURE 30: TOTAL EMPLOYMENT: JOLTS/BED, 1-9 WORKERS

NOTES: BED AND JOLTS ARE BENCHMARKED AGAINST QCEW 2018 Q1.