Summary of "Improving the Accuracy of Economic Measurement with Multiple Sources: The Case of Payroll Employment Data" by Cajner, Crane, Decker, Hamins-Puertolas, and Kurz

Question: Can we improve the measurement of payroll employment?

The Current Employment Statistics (CES) survey is closely watched by policymakers and financial markets. Despite being a large, carefully conducted survey, there is significant sampling error in the monthly estimates.[1] Sampling (and non-sampling) error adds noise to the signal in CES. We seek to improve the real-time measurement of payroll employment by combining the information in CES with data from another sample: the clients of the payroll processor ADP.

Data: Aggregate series derived from weekly ADP payroll microdata, as well as CES and QCEW.

The ADP dataset covers roughly 20% of U.S. employment, similar to the size of the CES sample.[2] The data consist of weekly database snapshots, which allow us to track establishment-level employment changes throughout the month, not just the CES reference period. We calculate weekly employment growth in industry-size cells using establishments that have reported for two consecutive pay periods, and then weight the industry-size indexes using QCEW employment shares to make the data more representative. We calculate changes as full-month averages, to smooth through short-term fluctuations that may add noise to the CES reference period. We have recently experimented with improvements in weighting and benchmarking.

Methods: We use a state-space model to extract the unobserved state driving both the CES and the ADP series.

We assume that true employment growth follows a monthly AR(1) process (or alternatively, a random walk), and that both ADP and CES are noisy signals of true employment growth.[3] This justifies the use of the Kalman filter to estimate the underlying state (true employment growth), both retrospectively and in real-time. We examine the robustness of the estimates to different assumptions on (1) the correlation of the observation noise, (2) the persistence of the state process, and (3) the estimation sample period.

Preliminary Results:

Our ADP-based series is highly correlated with CES at business cycle frequencies, even before benchmarking. In addition, the ADP series helps predict CES in real-time, pseudo out-of-sample exercises. We find that the Kalman filter puts approximately equal weight on the ADP series and the CES series. This is consistent with the two series representing roughly equal-sized samples. As a point of comparison, when we instead use CES and CPS as the observation variables we find that CPS has much less signal content than CES.

---

[1] See https://www.bls.gov/web/empsit/cesvarae.htm.

[2] The details of the ADP microdata and the derived indexes are described in the working paper "Using Payroll Processor Microdata to Measure Aggregate Labor Market Activity" by Cajner et al. (2018).

[3] These assumptions are approximately valid if firm employment growth is the sum of an aggregate AR(1) shock and a less persistent idiosyncratic AR(1) shock, and ADP and CES are independent samples of the finite population of firms. See, e.g., Cooper, Haltiwanger & Willis (2015) and Haltiwanger, Jarmin, Kulick & Miranda (2017) for evidence on the persistence of plant and firm employment growth.