Tracking Labor Market Developments during the COVID-19 Pandemic

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Federal Reserve Board of Governors

Disclaimer and Official Statistics

Official Disclaimer

- Opinions expressed herein are those of the authors alone and do not necessarily reflect the views of the Federal Reserve System.

The importance of the Federal Statistical System cannot be stressed enough at this time

- The research is not about replacing government statistics
- BLS CES and QCEW important in our applications

Introduction

Primarily drawing on two papers:

- "Tracking Labor Market Developments during the COVID-19 Pandemic: A Preliminary Assessment" by Cajner, Crane, Decker, Hamins-Puertolas & Kurz
- "The U.S. Labor Market during the Beginning of the Pandemic Recession" by Cajner, Crane, Decker, Grigsby, Hamins-Puertolas, Hurst, Kurz & Yildirmaz

Third paper for additional background and verification

- Cajner, Crane, Decker, Hamins-Puertolas & Kurz, " Improving the Accuracy of Economic Measurement with Multiple Data Sources: The Case of Payroll Employment Data," in *Big Data for 21st Century Economic Statistics*, University of Chicago Press, July 2020.

Introduction: Main Questions

What has happened in the labor market over the past 2 months?

- Estimates of how many jobs were lost, by week?
- Importance of exit and temporary layoffs
- Differences by size of business, industry
- Which workers lost jobs?

We need these answers to better understand how the market will evolve going forward.

- Use weekly, work- and firm-level data covering about 20% of U.S. workers.

Outline

- Data
- Methodology
- Aggregate job losses
- Small vs. large businesses
- Job losses by wage bin
- Differences by size of business, industry

Data

Our data are based on records from the payroll processor ADP:

- ADP processes paychecks for 20 percent of private U.S. workers
- Every pay period: client firm sends ADP data on the number of workers to pay

Two datasets:

- Business ("firm") level data: Best coverage, counts separately workers paid and workers in the system, no worker-level detail.
- Worker-level data: Skews towards larger firms, but has wages, age, other worker characteristics

All business-level and worker-level records are anonymized.

Data: Representativeness and Coverage

Representativeness:

- Not a probability sample
- Approximately representative by industry, size More
- We reweight by size and industry to match U.S. distribution

Coverage

- ADP covers about 20% of workers
- Very similar to the CES survey from BLS
- Far larger sample than CPS, JOLTS, other labor market surveys

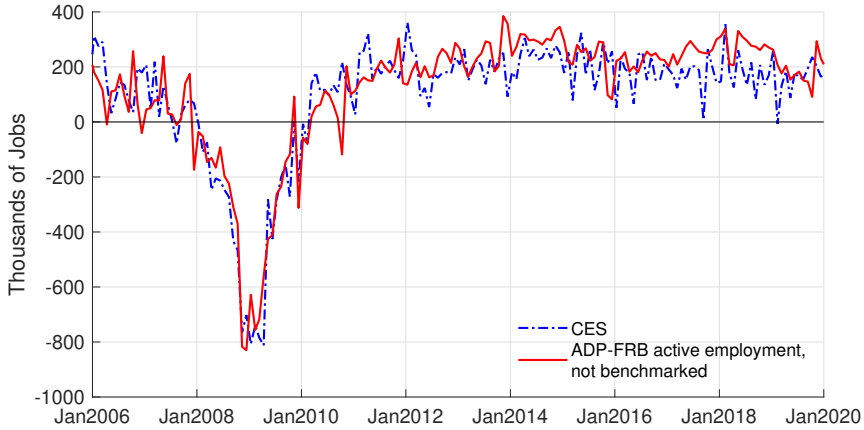
Methodology

(Documented more fully in previous work) How to build a weekly employment series from mixed-pay-frequency source data?

- Model it on CES
- For each Saturday, estimate employment for the pay periods that contain that Saturday
- Assume that all employment transitions occur between pay periods.

Main weekly results are not seasonally adjusted. Robust to seasonal adjustment, purging outliers, adjustments for predicable revisions.

Monthly Series Track BLS Statistics



Plotted through **February**. ADP-FRB tracks the business cycle very well (even without benchmarking).

Other Validation Exercises

- Eve-of-release ADP-FRB help nowcast CES, even when market expectations are included Regression Results
- State-space model places equal weight on CES and ADP-FRB
- State space estimate forecasts CES
- ADP-based compensation indexes predict revisions in comp per hour

Main points:

- ADP data complement CES, other government data sources
- Using ADP along with CES increases the effective sample size, reduces error
- ADP data are very timely & detailed, provide a quicker read on the market

Concepts and Terminology

Aggregate job losses: two employment concepts

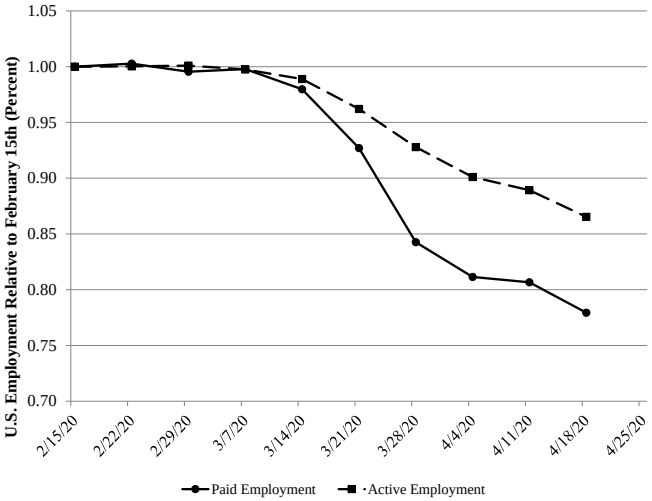
- "Paid" employment: Number of paychecks cut. Includes bonuses, corrections
- "Active" employment: Number of workers in the payroll system. Includes hourly workers with no hours, furloughed workers.

Role of "exit": Businesses that stop reporting any payroll

- May have permanently gone out of business
- May have temporarily suspended operations

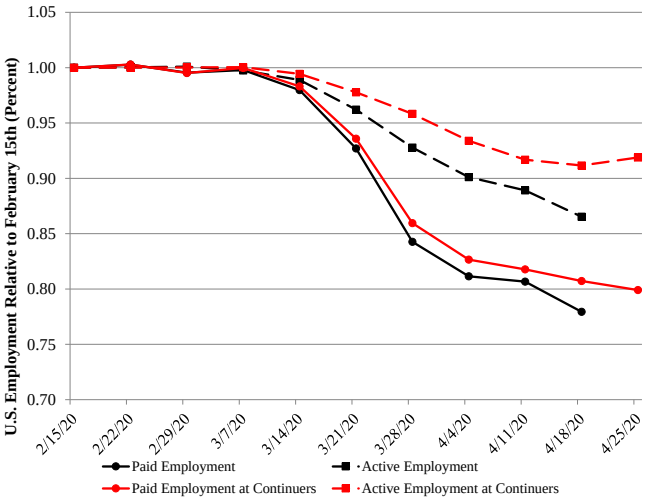
Results: Aggregate losses

- Active emp. fell 14%, paid fell 22%
- Fastest declines in late March



Results: Aggregate losses

- Active emp. fell 14%, paid fell 22%
- Fastest declines in late March
- Much of the declines are at continuing firms
- But exit/temporary shutdowns account for about 16% of paid emp. losses, 40% of active losses



Results: Aggregate losses

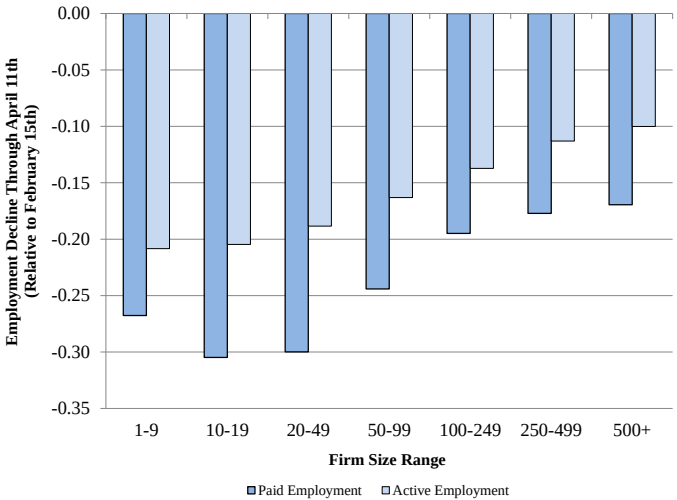
- By far the largest, fastest declines in employment since the Great Depression
- Hope that losses are temporary: If lockdowns are lifted and virus risk is reduced, many jobs should return fast
- Need to know more about exit: Are the firms that stopped paying everyone still going concerns? If not, could take much longer for jobs to return

Roughly consistent with BLS jobs report from Friday

- Our estimates imply larger job losses than BLS
- We might have cleaner estimates of exit (though BLS is doing a lot to improve theirs)
- Many possible sources of error for both estimates. We view them as complements

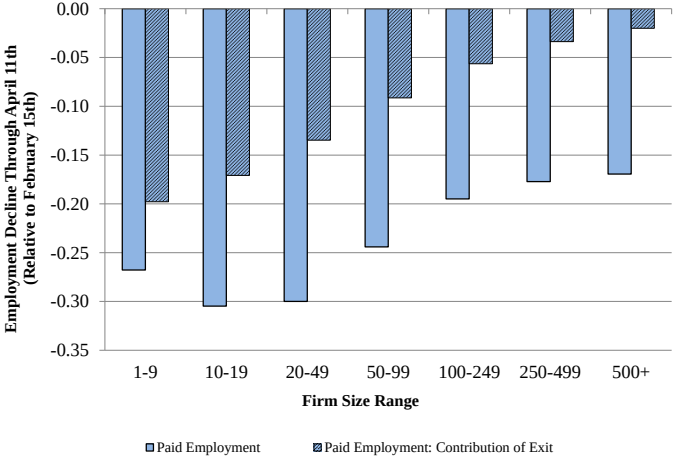
Results: Small vs. large businesses

- Small firms are suffering more
- Industry mix likely plays a role
- Active and paid patterns are similar



Results: Small vs. large businesses

- "Exit" is playing a huge role for small firms
- Larger firms shrink, but keep at least some workers on payroll

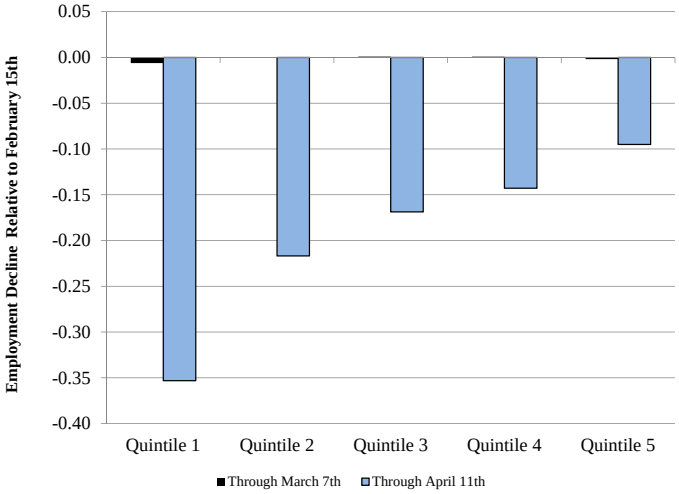


Results: Employment Change by Supersector

Industry	Active Employment Change	Paid Employment Change
Leisure and Hospitality	-19.8%	-45.1%
Trade, Transportation, and Utilities	-9.0%	-17.7%
Other Services	-5.7%	-17.3%
Construction	-4.9%	-14.5%
Education and Health Services	-0.8%	-13.4%
Manufacturing	-5.9%	-11.8%
Professional and Business Services	-6.0%	-11.5%
Information Services	-4.8%	-13.4%
Mining	-7.2%	-7.1%
Financial Services	-3.0%	-5.8%

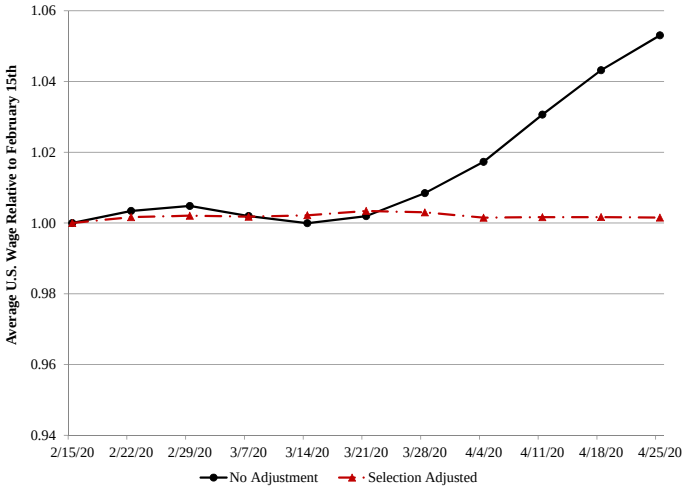
Which workers lost jobs?

- Job loss highly concentrated among low wage workers
- Robust to controls for industry, baseline turnover, etc.



Average wages

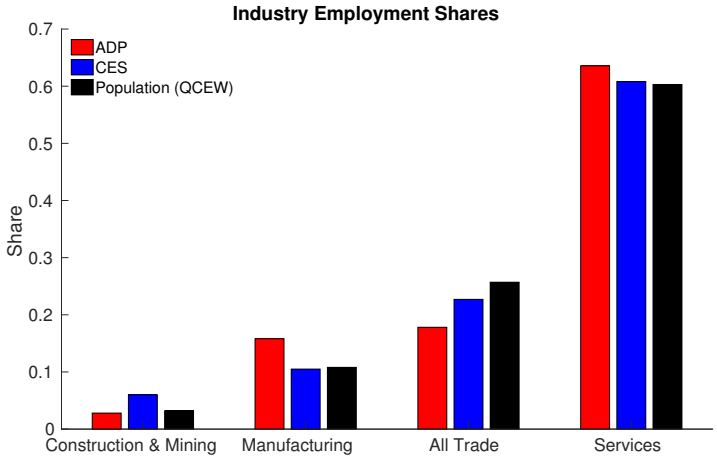
- As in CES, average wage rises steeply
- Driven by job losses at the bottom of the wage distribution
- Continuing workers show no obvious declines



Conclusions

- Payroll processor data shows very steep employment losses
- Smaller drop in "active" employment: hope that layoffs/furloughs are temporary
- Significant losses from businesses completely suspending operations. If exit is permanent, recovery will be harder
- Small businesses shutting down, larger mostly just shrinking

Representativeness



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Representativeness

Pay frequency	ADP emp.	ADP estabs.	QCEW estabs.
Weekly	23.4	22.4	32.2
Biweekly	55.1	45.8	40.0
Semimonthly	17.5	20.6	18.5
Monthly	4.0	11.2	9.3

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Representativeness

Census Region	ADP emp.	ADP estabs.	QCEW emp.
Northeast	28.2	28.1	18.2
South	29.4	30.2	34.9
Midwest	20.2	16.6	20.1
West	22.2	25.2	26.8

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Benchmark Revisions

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
ADP-FRB	-173	-451	12	709	283	-230	-1030	-853	-322	-623
CES	-137	-933	-391	229	481	340	105	-259	-151	136
CES No BD	645	-216	-55	561	972	975	874	638	737	1066

Notes: Units: Thousands of jobs. CES revisions are the post-benchmark (QCEW-based) March estimate less the pre-benchmark estimate. ADP-FRB revisions are calculated in a similar fashion. CES no BD are the CES benchmark revisions that would have occurred excluding net birth-death adjustment.

Source: `https://www.bls.gov/web/empsit/cesbmart.pdf`, authors' calculations.

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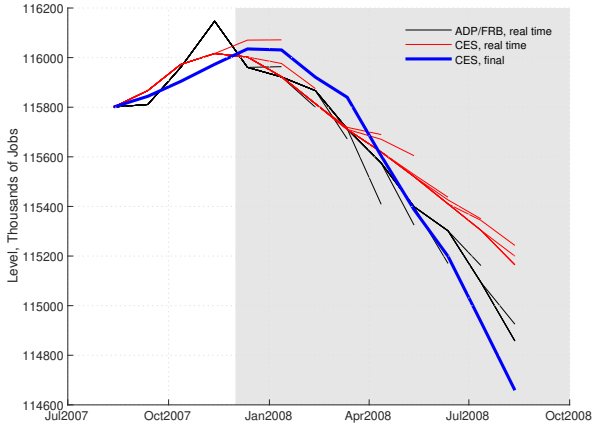
Real-Time vs. Current Vintage Estimates



During Great Recession ADP-FRB data outperformed CES data.

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Forecasting Annual Employment Changes

	(1)	(2)	(3)	(4)	(5)
CES	1.126***			1.104***	
	(0.0316)			(0.142)	
CES excl. Birth-Death		1.154***			0.927***
		(0.0235)			(0.0847)
ADP			0.976***	0.0197	0.199**
			(0.0543)	(0.121)	(0.0818)
Constant	-163.7*	604.5***	-135.1	-163.6*	452.5***
	(76.93)	(75.29)	(172.8)	(82.61)	(79.37)
Observations	10	10	10	10	10
Adj. R-squared	0.989	0.993	0.965	0.988	0.994
RMSE	299.2	243.3	535.9	319.7	224.2

Notes: Dependent variable is benchmarked annual change in private nonfarm employment, March to March. Years 2008-2017. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Robust standard errors in parentheses.

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Forecasting Monthly Employment Changes

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	(1)	(2)	(3)	(4)	(5)
ADP-FRB active employment			0.29**	0.39***	0.16**
			(0.11)	(0.11)	(0.07)
Lagged private CES employment	0.82***	-0.13	-0.21	0.51***	
	(0.07)	(0.15)	(0.14)	(0.12)	
Lagged UR change	-156.73**	-45.66	-43.05	-123.09**	
	(61.56)	(52.17)	(46.84)	(58.02)	
Unemployment expectations	39.17***	30.95***	14.08	16.55	15.21
	(11.82)	(11.01)	(12.29)	(12.74)	(10.88)
Initial UI claims	-3.10***	-0.91	-0.79	-2.52***	-0.56
	(0.74)	(0.71)	(0.72)	(0.83)	(0.52)
CES employment expectations		1.15***	0.98***		
		(0.16)	(0.15)		
Private CES employment					0.97***
					(0.07)
UR change					33.12
					(36.03)
Constant	4.87	-17.77*	-24.39**	-7.48	-17.85**
	(9.36)	(10.40)	(11.58)	(10.77)	(8.98)
RMSE	99	84	80	92	58

Notes: Dependent variable is final print of CES private employment. ADP series are real-time vintage, as of 5 weeks after the start of the month (i.e., the week before or week of the Employment Situation release). Unemployment expectations are from the Michigan survey. CES employment expectations are eve-of-release median markets expectations. Lagged private CES employment refers to pre-Employment Situation release. Robust standard errors in parentheses. RSMEs are calculated in-sample. * $p<0.10$, **

Forecasting Monthly Employment Changes with State Estimate

	(1) CES employment	(2) CES employment	(3) 3-month average CES employment
Constant	-28.14	-28.52	-17.05
	(19.43)	(18.78)	(20.35)
ADP-CES State	1.43***	1.50***	1.69***
	(0.49)	(0.55)	(0.44)
ADP-FRB Emp.	-0.18	-0.19	-0.30**
	(0.15)	(0.16)	(0.15)
CES Emp.	-0.18	-0.11	-0.41
	(0.34)	(0.55)	(0.31)
CES State		-0.12	-0.04
		(0.68)	(0.42)

Notes: The dependent variable in columns 1 and 2 is the fully revised change in CES private employment at time $t+1$; in column 3 the dependent variable is the average of the fully revised change in CES private employment for $t+1$, $t+2$ and $t+3$. ADP series are real-time vintage, as of 5 weeks after the start of the month. CES series appearing as independent variable or in state-space estimates are real-time vintage. Robust standard errors in parentheses. * p<0.10, ** p<0.05, ***