





COVID-19 and Pennsylvania's Economy

March 2021

COVID-19 and Unemployment Claims by Sector in Pennsylvania: February 2020 through January 9, 2021

The COVID-19 pandemic has had a significant impact on Pennsylvania's economy, as evidenced by business closures, high unemployment, and falling tax revenues. Many workers, business owners, and others have been struggling to adapt, and too many have seen their livelihoods threatened or lost. To better know how to respond, it is important to understand which specific parts of the economy particularly are being affected by the pandemic.

This report examines how unemployment claims varied across Pennsylvania's economic sectors during COVID-19, focusing on what occurred during the early and middle phases of COVID-19 in the Commonwealth. It also considers the impacts across sectors on payroll. This report thus highlights which economic sectors in Pennsylvania and in individual counties have been particularly negatively affected by the pandemic.

About the Data and Analysis in this Report

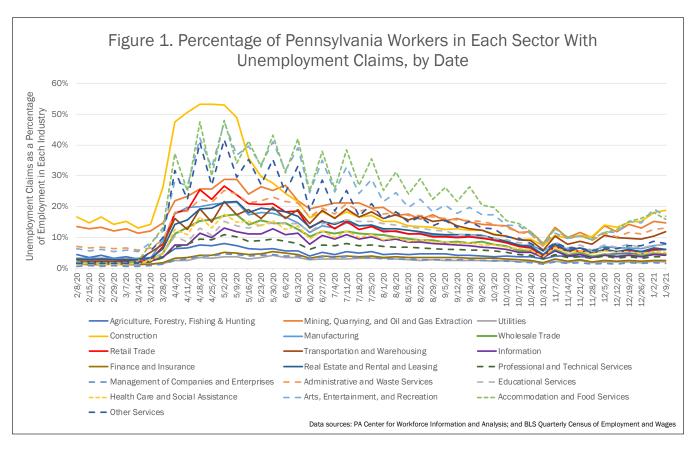
The unemployment claims data used in this report is from the Pennsylvania Department of Labor's Center for Workforce Information and Analysis (CWIA) and consists of new and continued unemployment claims received by the Pennsylvania Office of Unemployment Compensation through January 9, 2021. The data includes the total number of claims by sector, sex, age, and race, and is released regularly. Applicants file claims on a bi-weekly basis, so the data can show a pattern of higher claims one week followed by fewer claims the next week.

The analysis in this report compares this unemployment claims data to total employment and payroll in each sector of Pennsylvania's economy during the fourth quarter of 2019, as reported by the U.S. Bureau of Labor Statistics' Quarterly Census of Employment and Wages (QCEW). It thus estimates unemployment claims by sector as a percentage of employment prior to the onset of COVID-19. Impacts on payroll were estimated using average weekly wages in Pennsylvania by sector in 2019, as reported by the QCEW. The analysis here focuses on the timeframe of February 2020 through January 9, 2021, and essentially provides a snapshot of unemployment during the early and middle phases of the COVID-19 pandemic.



Unemployment Claims by Sector Over Time

Not unexpectedly, the percentage of workers filing unemployment claims under COVID-19 varied dramatically across economic sectors. The impact of COVID-19 on employment becomes clearer when looking at unemployment claims over time (see Figure 1. The weekly data in Figure 1 also appears in Table 1). The oscillating nature of claims in some sectors – up one week, down the next, and up again the following week – reflects that applicants file claims every two weeks. Unemployment claims remained relatively steady through February and most of March 2020, with workers in the Construction sector and Mining, Quarrying, and Oil and Gas Extraction sector being more likely to file unemployment claims (at rates of around 14% and 12%, respectively) than workers in other sectors (see Table 1).



Unemployment claim rates by sector increased dramatically at the end of March and early April 2020, as public awareness of COVID-19 increased, and state government, consumers, and businesses started taking actions to reduce exposure. Claims continued to build through April, peaking in some sectors in late April and early May. Unemployment claims in Construction, for example, peaked at about 53% on April 25, while claims in Accommodations and Food Services peaked at 47.9% on May 2. The Accommodation and Food Service sector includes restaurants, hotels, and other accommodations, all of which have been particularly affected by the drop in travel, tourism, and dining caused by the pandemic. Claims from Arts, Entertainment, and Recreation workers similarly peaked on May 2, equal to about 47% of the total workforce in the sector (see Table 1).

Table 1. Percentage of Pennsylvania Workers in Each Sector With Unemployment Claims in 2020 - 2021, by Date	centage of	Pennsylvaı	nia Worke	rs in Each	Sector Wi	h Unempl	oyment Cl	aims in 20	200 - 2021	, by Date		
						Date	ø.					
Sector	2/22/20	3/1/20	3/21/20	4/4/20	4/18/20	5/2/20	5/16/20	5/30/20	6/13/20	6/27/20	7/11/20	7/25/20
Agriculture, Forestry, Fishing & Hunting	4.1%	3.7%	3.4%	6.2%	7.4%	8.0%	%8.9	6.2%	2.6%	2.0%	2.3%	5.2%
Mining, Quarrying, and Oil & Gas Extraction	13.2%	12.8%	12.1%	21.8%	25.7%	28.7%	24.0%	25.2%	21.9%	20.2%	21.1%	19.5%
Utilities	1.0%	1.1%	1.2%	2.4%	3.3%	3.7%	3.0%	4.1%	3.5%	2.9%	3.0%	3.1%
Construction	16.5%	15.1%	14.2%	47.5%	53.1%	52.9%	35.8%	27.6%	21.7%	18.3%	18.2%	17.0%
Manufacturing	3.1%	3.0%	3.1%	17.4%	19.9%	21.0%	17.3%	17.6%	14.6%	13.6%	14.7%	13.8%
Wholesale Trade	2.0%	2.0%	2.2%	11.2%	15.3%	16.9%	14.0%	14.5%	12.6%	11.8%	11.8%	11.0%
Retail Trade	1.9%	1.9%	2.8%	17.9%	25.3%	26.7%	21.0%	20.9%	18.6%	15.4%	15.1%	13.6%
Transportation and Warehousing	2.8%	2.7%	5.1%	16.0%	19.3%	21.6%	19.0%	19.7%	18.9%	18.7%	19.3%	18.2%
Information	1.7%	1.7%	2.2%	7.4%	11.3%	13.0%	11.0%	12.7%	11.4%	10.7%	10.8%	10.1%
Finance and Insurance	1.2%	1.2%	1.3%	3.2%	4.2%	5.0%	4.3%	5.3%	4.3%	3.8%	3.9%	3.8%
Real Estate and Rental and Leasing	2.6%	2.5%	3.1%	14.2%	19.2%	21.3%	18.0%	19.0%	16.7%	15.1%	15.5%	13.9%
Professional and Technical Services	1.8%	1.7%	1.9%	8.9%	9.5%	10.7%	8.6%	9.4%	7.9%	7.4%	7.9%	7.5%
Management of Companies & Enterprises	%9.0	%9:0	0.7%	2.5%	3.9%	4.5%	3.9%	4.3%	3.8%	3.6%	3.6%	3.3%
Administrative and Waste Services	%8.9	6.5%	6.5%	17.9%	22.2%	25.1%	21.1%	23.1%	21.2%	19.5%	20.8%	19.2%
Educational Services	1.2%	1.2%	3.0%	10.4%	13.1%	15.2%	12.9%	14.7%	14.4%	14.5%	15.7%	15.1%
Health Care and Social Assistance	1.3%	1.3%	2.4%	12.4%	16.4%	17.6%	15.2%	15.3%	13.7%	12.0%	12.0%	10.8%
Arts, Entertainment, and Recreation	6.1%	5.9%	8.1%	28.3%	42.1%	47.4%	39.6%	41.0%	39.1%	35.0%	32.8%	28.6%
Accommodation and Food Services	1.8%	1.8%	7.7%	37.0%	47.5%	47.9%	41.3%	43.0%	42.0%	37.9%	38.4%	35.4%
Other Services	1.4%	1.4%	5.5%	31.6%	40.6%	41.6%	35.3%	35.2%	33.2%	28.4%	25.3%	20.9%
rotago	00/8/8	00/00/8	0/8/20	0/10/20	10/3/20	10/17/20	10/31/20	11/11/20	11/28/20	12/12/20	12/26/20	1/0/01
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Construction	15.0%	13.5%	12.5%	12.3%	%0TI	9.5%	%5.7 Sr r	9.0°	%Z.OT.	13.2%	15.1%	18.7%
Manufacturing	11.7%	11.3%	10.3%	10.3%	80.6	7.3%	2.5%	6.1%	2.6%	6.4%	6.2%	7.7%
Wholesale Trade	10.0%	9.1%	8.4%	8.1%	7.5%	2.7%	3.6%	4.2%	3.7%	3.8%	3.9%	4.5%
Retail Trade	12.0%	11.1%	10.2%	10.0%	%0.6	7.1%	4.0%	5.4%	4.8%	5.3%	5.2%	9.0%
Transportation and Warehousing	17.2%	16.8%	15.6%	12.8%	10.9%	9.5%	2.8%	7.7%	7.7%	10.0%	9.3%	11.7%
Information	9.3%	8.5%	7.8%	7.2%	%9.9	5.2%	3.4%	4.0%	3.4%	3.6%	3.5%	4.2%
Finance and Insurance	3.6%	3.4%	3.3%	3.2%	3.1%	2.6%	1.7%	2.2%	2.0%	2.2%	2.1%	2.4%
Real Estate and Rental and Leasing	12.7%	11.9%	10.7%	10.8%	9.1%	7.4%	4.3%	2.5%	4.8%	5.3%	5.3%	6.1%
Professional and Technical Services	8.9	6.5%	%0.9	5.9%	5.5%	4.3%	2.9%	3.4%	3.1%	3.3%	3.2%	3.6%
Management of Companies & Enterprises	3.0%	2.7%	2.7%	2.6%	2.4%	1.9%	1.2%	1.5%	1.2%	1.3%	1.4%	1.6%
Administrative and Waste Services	17.9%	17.0%	16.0%	15.4%	14.2%	11.5%	7.0%	9.3%	%0.6	10.1%	10.9%	12.9%
Educational Services	13.9%	12.9%	11.9%	10.9%	9.7%	8.2%	5.3%	6.5%	2.8%	6.8%	6.4%	7.5%
Health Care and Social Assistance	%6.6	9.2%	8.5%	8.1%	7.4%	6.2%	3.7%	2.0%	4.6%	5.0%	4.6%	5.1%
Arts, Entertainment, and Recreation	24.5%	22.3%	20.4%	19.8%	17.4%	13.7%	7.8%	9.6%	9.1%	11.5%	14.6%	16.7%
Accommodation and Food Services	31.2%	28.9%	26.2%	26.3%	19.7%	14.4%	7.7%	10.0%	9.4%	12.5%	16.1%	15.7%
Other Services	18.3%	16.6%	15.4%	15.0%	12.7%	%9.6	2.7%	%9.9	2.6%	6.3%	7.2%	7.9%
				Dat	a sources: PA	Center for Work	force Informa	tion and Analys	sis; and BLS Q	Data sources: PA Center for Workforce Information and Analysis; and BLS Quarterly Census of Employment and Wages	of Employmer	nt and Wages

Since the peak of unemployment claims by sector in late April and early May 2020, claims declined steadily through late October, but then began to rise again with the late-fall wave of COVID cases. Some sectors are experiencing higher peaks than others were at the beginning of January. For example, claims from the Accommodation and Food Service sector and Arts, Entertainment, and Recreation sector remained high on January 9, 2021, at 15.7% and 16.7%, respectively.

The trends over time vary across sectors, reflecting differences between them. Claims within Construction remained high through April but then fell precipitously in early May and continued to decline into summer and fall as construction work projects resumed across the Commonwealth. Claims then rose during November and December, in part due to the seasonal nature of the work.

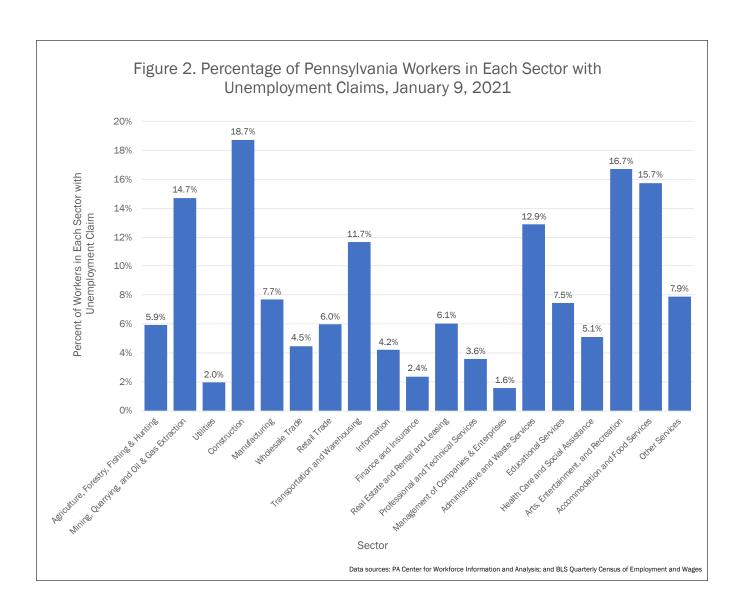
The increase in unemployment claims in other sectors was smaller but no less historic or disruptive to the workers' lives. Claims in the Administrative and Waste Services sector, which include businesses focused on waste disposal, cleaning, security and surveillance, and office and clerical services, similarly peaked during the first week of May, at 25.1%, but had declined to 12.9% as of January 9, 2021.

The Retail Trade sector similarly was hard hit, with claims peaking at almost 27% on May 2. Two sectors which support retail activity similarly peaked around the same time, with Wholesale Trade experiencing unemployment claims of about 17% on May 9, and Transportation and Warehousing peaking at 22% on May 2. As of January 9, 2021, these sectors have been recovering; claims from Retail Trade declined by 77.7% from their peak and claims from Wholesale Trade declined by about 74% from their peak, but the rates are now relatively low (6.0% and 4.5%, respectively). In contrast, Transportation and Warehousing has only declined 46% during this same time period and remained high at 11.7%. Unemployment claims in the Health Care and Social Assistance sector peaked at about 18% on May 2, likely due to the cancellation of most elective medical procedures and closing of dental and other medical offices, and declined to about 5% by January 9, 2021.

Several sectors experienced relatively small increases in unemployment claims during this same timeframe, including Utilities (peak of 4.1% on May 30), which was considered life-sustaining by the governor's order, and Management of Companies and Enterprises (peak of 4.5% on May 2) and Finance and Insurance (peak of 5.3% on May 30). The latter sectors presumably saw relatively small unemployment because much of their work can be done remotely or at a social distance.

Unemployment Claims by Sector on January 9, 2021

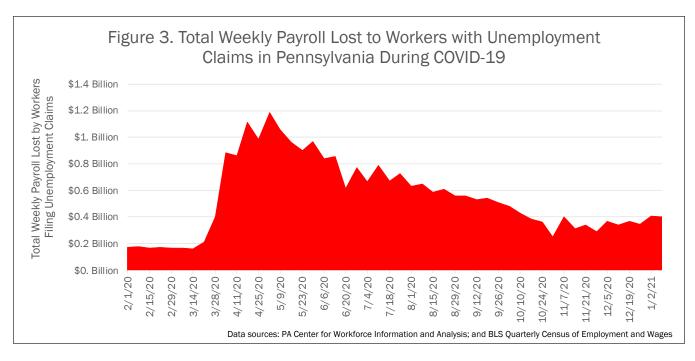
As of January 9, 2021, unemployment claims from all economic sectors in Pennsylvania had declined from their peaks early in the pandemic, yet conditions varied dramatically between them. Almost 16% of workers in the Accommodation and Food Service sector filed a new or continuing claim during the week of January 9, 2021, for example, as did 16.7% of workers in the Arts, Entertainment, and Recreation sector, compared to only 2% of workers in the Utilities sector, and 1.6% of workers in the Management of Companies and Enterprises sector. The Finance and Insurance claims were 2.4% (see Figure 2).



Lost Wages & Salaries

One way to measure the impact of these unemployment claims is to consider the wages and salaries that the unemployed workers lost due to the layoffs. Individually, many of the applicants received unemployment compensation which would have helped them adjust to the lost income, but from a statewide perspective this lost payroll reflects a loss of productivity. To the extent that unemployment insurance does not cover these losses, it also represents lost income to workers and thus lost spending in the community.

The estimated weekly payroll lost to workers with unemployment claims increased dramatically in early April as unemployment claims rose, rising from just less than \$200 million a week through February 2020 to about \$900 million on April 18, and peaking at about \$1.2 billion a week on May 2 (see Figure 3). Lost weekly payroll has declined somewhat since that peak, but as of January 9, 2021 it was still almost 2.5 times pre-pandemic levels. These losses are cumulative, totaling about \$26.9 billion from March 21 through January 9, 2021.



Unemployment payments helped reduce the net impact of this lost payroll on Pennsylvania's economy. Notably, from the week ending April 4 through July 25, unemployed Pennsylvania workers were eligible for an additional \$600 per week in unemployment benefits through the federal stimulus bill passed by Congress in late March. If all workers filing unemployment claims received this supplemental \$600, the total of such federal dollars would have been around \$9.5 billion, significantly assisting the unemployed workers and helping sustain Pennsylvania's economy during the downturn by making up for much of the lost earnings. Very likely the economic disruptions in Pennsylvania's economy would have been much worse without these supplemental dollars.

No single sector accounted for a majority of the lost payroll within Pennsylvania, though several sectors had larger shares of those losses. Between 15% and 18% of the total losses statewide occurred in the Health Care and Social Assistance sector, depending upon the week, while lost payroll in the Manufacturing sector accounted for between 12% and 15% of statewide losses through January 9, 2021 (see Table 2). The relatively large size of these two sectors' impacts likely reflects relatively higher wages in health care and in manufacturing compared to other sectors.

In contrast, though experiencing relatively high unemployment, lost payroll in the Accommodation and Food Service sector ranged from about 5% to 9% of payroll losses statewide, and lost payroll in the Arts, Entertainment and Recreation sector ranged from 2% to about 3% of statewide losses from late March through January 9, 2021. Losses in the Retail Trade sector accounted for about 4% to 8% of statewide losses during this same timeframe. Total payroll in these three sectors tends to be lower than in other sectors due to the relatively large number of part-time employees and the generally lower hourly wages.

The share of lost payroll statewide due to claims in the Construction sector actually decreased through the pandemic as other sectors experienced dramatic increases in claims and as construction hiring picked up in late April and May, falling from about 32% of lost payroll statewide on March 7 to only 16.4% on January 9, 2021.

Table 2. Share of Weekly Payroll Lost to Workers with Unemployment Claims in Pennsylvania During COVID-19, by Sector

Sector Agriculture, Forestry, Fishing & Hunting Mining, Quarrying, and Oil & Gas Extraction	2/22/20											
Agriculture, Forestry, Fishing & Hunting Mining, Ouarrying, and Oil & Gas Extraction	/ /-	3/7/20	3/21/20	4/4/20	4/18/20	5/2/20	5/16/20	5/30/20	6/13/20	6/27/20	7/11/20	7/25/20
Mining, Ouarrying, and Oil & Gas Extraction	0.4%	0.4%	0.3%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
ò	%0.0	%0.0	%0:0	%0:0	%0.0	0.0%	%0.0	%0.0	%0.0	0.0%	%0.0	0.0%
Utilities	0.3%	0.3%	0.3%	0.1%	0.1%	0.2%	0.1%	0.2%	0.5%	0.2%	0.2%	0.2%
Construction	34.7%	33.3%	24.4%	19.6%	17.4%	16.3%	13.6%	10.4%	9.5%	8.7%	8.5%	8.6%
Manufacturing	12.9%	13.1%	10.6%	14.2%	12.9%	12.8%	13.0%	13.2%	12.3%	12.7%	13.5%	13.8%
Wholesale Trade	4.2%	4.3%	3.6%	4.5%	4.9%	5.1%	5.2%	5.3%	5.2%	5.4%	5.3%	5.4%
Retail Trade	4.1%	4.3%	4.9%	7.6%	8.6%	8.5%	8.2%	8.1%	8.2%	7.5%	7.2%	7.1%
Transportation and Warehousing	4.4%	4.4%	6.5%	4.9%	4.7%	4.9%	5.3%	5.5%	%0.9	9.9	89.9	%8.9
Information	1.5%	15%	1.6%	1.3%	1.5%	1.7%	1.7%	2.0%	2.0%	2.1%	2.1%	2.1%
Finance and Insurance	3.3%	3.4%	3.0%	1.7%	1.8%	2.0%	2.1%	2.6%	2.4%	2.3%	2.4%	2.5%
Real Estate and Rental and Leasing	1.2%	12%	1.2%	1.3%	1.4%	1.5%	1.5%	1.6%	1.6%	16%	16%	1.5%
Professional and Technical Services	7.8%	8.0%	7.0%	%0'9	9.9	7.0%	%6.9	7.5%	7.1%	7.4%	7.7%	8.0%
Management of Companies & Enterprises	%0.0	%0.0	%0:0	%0.0	0.0%	0.0%	%0.0	%0.0	0.0%	%0.0	%0.0	%0:0
Administrative and Waste Services	9.7%	9.7%	7.6%	2.0%	4.9%	5.2%	5.4%	5.9%	6.1%	6.2%	6.5%	6.5%
Educational Services	1.6%	16%	3.2%	2.7%	2.7%	2.9%	3.0%	3.4%	3.8%	4.2%	4.5%	4.7%
Health Care and Social Assistance	8.4%	8.7%	12.6%	15.7%	16.5%	16.5%	17.6%	17.6%	17.8%	17.3%	17.0%	16.7%
Arts, Entertainment, and Recreation	2.5%	2.5%	2.7%	2.2%	2.7%	2.8%	2.9%	3.0%	3.2%	3.2%	2.9%	2.8%
Accommodation and Food Services	1.9%	2.1%	%8.9	7.8%	8.0%	7.6%	8.0%	8.3%	9.5%	9.2%	9.1%	9.1%
Other Services, Ex. Public Admin	1.2%	12%	3.7%	5.1%	5.2%	2.0%	5.2%	5.2%	5.5%	5.3%	4.6%	4.1%
Total Weekly Payroll Foregone	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Sector	8/8/20	8/22/20	9/5/20	9/19/20	10/3/20	10/17/20	10/31/20	11/14/20	11/28/20	12/12/20	12/26/20	1/9/21
Agriculture, Forestry, Fishing & Hunting	0.1%	0.1%	0.1%	0.1%	0.1%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.3%
Mining, Quarrying, and Oil & Gas Extraction	%0.0	%0.0	%0:0	%0:0	0.0%	0.0%	0.0%	%0.0	%0.0	0.0%	0.0%	0.0%
Utilities	0.2%	0.2%	0.2%	0.2%	0.5%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%
Construction	8.4%	8.1%	8.1%	8.3%	8.4%	8.8%	10.7%	11.2%	12.7%	14.2%	15.8%	16.9%
Manufacturing	13.0%	13.4%	13.3%	13.7%	13.5%	13.6%	15.9%	14.1%	13.8%	13.6%	12.9%	13.7%
Wholesale Trade	5.5%	5.3%	5.3%	5.3%	5.5%	5.2%	5.2%	4.8%	4.5%	4.0%	4.0%	3.9%
Retail Trade	7.0%	%6.9	%6.9	7.0%	7.1%	%6.9	6.1%	6.5%	6.3%	5.9%	5.6%	2.6%
Transportation and Warehousing	7.2%	7.5%	7.5%	6.4%	6.2%	6.4%	6.4%	%2'9	7.2%	8.0%	7.3%	7.8%
Information	2.2%	2.1%	2.1%	2.0%	2.1%	2.1%	2.1%	1.9%	1.8%	1.6%	1.5%	1.6%
Finance and Insurance	2.6%	2.7%	2.8%	2.9%	3.1%	3.2%	3.3%	3.4%	3.3%	3.1%	2.9%	2.8%
Real Estate and Rental and Leasing	1.6%	7.6%	1.5%	1.6%	1.6%	1.6%	1.4%	1.4%	1.3%	13%	1.2%	1.2%
Professional and Technical Services	8.0%	8.2%	8.3%	8.4%	8.8%	8.7%	8.9%	8.4%	8.1%	7.4%	7.1%	8.9
Management of Companies & Enterprises	%0.0	%0.0	%0:0	%0.0	0.0%	%0.0	%0.0	%0.0	%0.0	%0.0	%0.0	0.0%
Administrative and Waste Services	%8.9	%6.9	7.0%	7.0%	7.4%	7.4%	7.0%	7.4%	7.6%	7.4%	7.8%	7.9%
Educational Services	4.8%	4.8%	4.8%	4.6%	4.6%	4.8%	4.9%	4.7%	4.5%	4.6%	4.2%	4.2%
Health Care and Social Assistance	17.0%	16.9%	16.8%	16.7%	17.2%	17.9%	16.4%	17.8%	17.5%	16.5%	14.9%	14.1%
Arts, Entertainment, and Recreation	2.7%	2.6%	2.5%	2.6%	2.6%	2.5%	2.2%	2.1%	2.2%	2.4%	2.9%	2.9%
Accommodation and Food Services	%0.6	8.9%	8.7%	9.1%	7.7%	7.0%	5.8%	%0.9	%0.9	%6.9	8.6%	7.3%
Other Services, Ex. Public Admin	4.0%	3.9%	3.9%	4.0%	3.8%	3.6%	3.3%	3.0%	2.7%	2.7%	2.9%	2.8%
Total Weekly Payroll Foregone	70000	70000										
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Implications and Conclusions

The unemployment claim data demonstrates the significant impact that COVID-19 has had on Pennsylvania's economy and workforce. The data suggests that almost all sectors of Pennsylvania's economy have been negatively affected by the pandemic. Most sectors slowly recovered through the summer and early fall as businesses learned how to adapt to social distancing restrictions and remote work. Sectors more dependent upon in-person customers, such as the tourism- and travel-dependent sectors, experienced the most significant unemployment claim rates through January 9, 2021. Payroll lost by Pennsylvania workers claiming unemployment totaled about \$26.9 billion from March 21, 2020, through January 9, 2021, which reflects a significant loss of productivity within the Commonwealth's economy. Unemployment payments, and particularly the temporary additional \$600 per week benefits from the federal stimulus bill, helped reduce the impact on unemployed workers and their households during this time period, and helped keep money flowing into Pennsylvania's economy. Without such aid the negative economic impacts of the pandemic likely would have been worse.

There are some caveats with this analysis. The CWIA website notes that their data "should be used as a gauge of the unemployment situation in an area and/or industry and should not be considered an exact real-time count of individuals/claims." These findings thus need to be viewed in the same manner. In addition, since the data is based upon official unemployment claims filed with the state, workers ineligible to apply for unemployment are not included in these numbers. Such workers include people driving for Uber or otherwise within the gig economy and self-employed workers. The CWIA data and thus these estimates omit the impacts on those workers, so the impact of COVID-19 on unemployment claims likely is larger than what is reported here.

In addition, hourly wage workers whose work hours were reduced or who otherwise experienced cuts in pay may not have made unemployment claims. The data thus likely also undercounts the impact on wages and salaries. In addition, the data focuses solely on jobs and payroll, not on actual productivity; many workers who remained employed likely were less productive than normal due to stress about the pandemic, having to suddenly adjust to new work procedures or location, and other factors associated with COVID-19. The true impact on Pennsylvania's economy thus likely is greater than these estimates.

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More information: This report is part of a series called "COVID-19 and Pennsylvania's Economy." Additional analysis, including unemployment claims rates by worker race, sex, and age over time, is available online at https://aese.psu.edu/research/centers/cecd/publications.

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This report was prepared by Timothy W. Kelsey and Kayla Gordon. With questions about this report, please contact Timothy Kelsey at tkelsey@psu.edu.

The Center conducts more detailed analysis around these and other topics of interest. For more information please contact:

Alyssa Gurklis at azg5380@psu.edu

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