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Labour Market Effects of the Great Lockdown in South Africa: Earnings and Employment During 2020–2022

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Abstract

This paper quantifies the impact of the covid-19 economic shock on aggregate earnings and employment by industry in South Africa. We construct pre-covid-19 counterfactual forecasts for the 2020 Q2 – 2022 Q4 period and compare these with reported earnings and employment levels up to 2021 Q1. We find that total compensation of employees in 2020 Q2 was 9% below forecast while employment was 14% lower than the counterfactual. Between 2020 Q2 and 2021 Q1, aggregate earnings recovered more than three times as quickly as employment, indicating a rise in inequality. We calculate possible recovery paths of earnings and employment to 2022 Q4. We outline implications for the Unemployment Insurance Fund and suggest ways in which the employment recovery might be accelerated.

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Contents

Acronyms

AIC	Akaike information criterion
ARMA	autoregressive moving average
CoE	compensation of employees
HP filter	Hodrick-Prescott filter
LMDSA	Labour Market Dynamics in South Africa
NIDS-CRAM	National Income Dynamics Study Coronavirus Rapid Mobile Survey
PALMS	Post-Apartheid Labour Market Series
QLFS	Quarterly Labour Force Survey
SA	South Africa
SALDRU	Southern Africa Labour and Development Research Unit
SIC	Standard Industrial Classification
StatsSA	Statistics South Africa
TERS	Temporary Employer/Employee Relief Scheme
UIF	Unemployment Insurance Fund

1 Introduction

This paper quantifies the impact of the covid-19 economic shock on the labour market in South Africa. We construct pre-covid-19 counterfactual trends for earnings and employment by industry for 2020–2022 and compare these with reported outcomes. We outline a possible recovery path for 2021 and 2022, noting that employment appears to be lagging the economy's recovery in earnings and incomes.

We use simple autoregressive forecasting models to generate pre-covid-19 projections of quarterly earnings and employment levels, by industry. Our analysis focuses on compensation of employees as recorded in the national GDP production accounts, and employment levels by industry recorded in the Quarterly Labour Force Survey (QLFS). We write this paper with data available up to the first quarter of 2021.[1]

Our analysis seeks only to compare post-Covid labour market outcomes with straightforward projections that take into account underlying short-term trends and seasonal variations in earnings and employment by industry. We do not take broader macroeconomic dynamics or prospects into account, and we do not explore dynamic interactions between sectors or between South Africa and the global economy. We note that the economic downturn in the second quarter of 2020 was rapid and characterized by strong interaction effects between production, income and spending across a wide range of economic activities (Arndt, et al., 2020; Robinson, et al., 2021). We do not seek to quantify or assess how these dynamics will evolve during the recovery phase. Our purpose is the more modest one of comparing the size and decline of earnings and employment, and their respective rates of recovery. We comment on the implications of what appears to be an astonishingly large gap between the earnings recovery and the employment recovery.

Our analysis is conducted at the one-digit level of the Standard Industrial Classification (SIC). We limit our counterfactual projections and forecast recovery to the 2020–2022 period, recognizing that there are widening degrees of uncertainty beyond the short-term outlook.

The projections make use of seasonal autoregressive (AR) models, fitted to the time series trends of real compensation of employees (CoE) and employment, by industry. At the time of writing these data were available up to 2021 Q1, so we are able to show the effect of the lockdown for four quarters. Beyond that, we seek to model 'impulse response' recoveries by industry. We caution that these projections are methodologically naïve and rely on data that are subject to quality concerns.[2]

2 Compensation of employees—loss of earnings and recovery path

Quarterly estimates of the compensation of employees (CoE) by industry are published by Statistics South Africa (StatsSA) as part of the national (GDP) accounts.[3] We use this data series beginning in 2010 Q1, scaled to 2020 Q2 prices using the headline consumer price index. We note that the CoE aggregate does not account for all earnings from work, as it excludes earnings included in "mixed income" of the self-employed or owner-operators in the household sector. Our analysis assumes that there have not been significant changes in the ratio of CoE to total employment earnings by industry over the period under review.

We fit a seasonal autoregressive (AR) model to the real CoE 2010–2020 Q1 time series by industry, and calculate forecasts based on these models for the period 2020 Q2 to 2022 Q4. These provide the counterfactuals against which outcomes for 2020 Q2–2021 Q1 can be compared. For the subsequent period, the forecasts provide benchmarks

[1] The R source code for this paper is provided at https://social-insurance.saldru.co.za/ters/qlfs-2020

[2] Limitations of the QLFS data collection in 2020 under restricted Covid-19 conditions are noted in Kohler, et.al. (2021). Inconsistencies between the official employment and earnings series and the national accounts are explored in Donaldson and Horn (2021).

[3] Table 27 of the P0441 series.

against which possible recovery paths can be projected.

Figure 1 shows the level of total compensation of employees over time, for each industry, in both nominal and real terms, and our forecast of real earnings for the 2020–2022 period. These graphs show that the trends in CoE are highly seasonal, which we take into account in our selection of a method of analysis. Figure 3 (further down) focuses on more recent years. Real total compensation of employees increased over the past decade in all sectors, although a tapering off is apparent towards the end of the decade. This means that employment or mean earnings increased generally, although slowdowns or declines in real earnings growth after about 2015 are apparent in several sectors. Figure 1 shows that the public service wage bill is a large share of the total, and has increased more rapidly than private sector services. One should note that the size of each industry is mostly just a feature of how the industries are defined and partitioned in the total economy. Households are not an identified industrial sector in the national accounts, so we are not able to separate domestic household service earnings from the non-government services sector.

2.1 Method

For each industry, we run a seasonal autoregression of the quarter-on-quarter growth rate of real total compensation of employees (CoE). This time series method, as opposed to regressing on time, avoids serial correlation in the errors of the regression. One needs to analyze the growth rate of a macroeconomic variable, such as earnings over time, because the trend is expected to be exponential. An autoregressive model needs to be fitted to a *stationary* time series, that is, one where the level does not increase over time. The constant in the growth rate trend is akin to a constant level of growth over time. We fit the models up to the *first* quarter of 2020, then use those fitted models to forecast the trends further into the future.

We first examined aggregate CoE to find a model specification suitable for the aggregate economy. We explore different specifications of autoregressive moving average (ARMA) models, and find that one autoregressive lag and one seasonal lag are each highly significant. We choose a simple model because 'overspecification' can exist when the model is so finely tuned to the empirical data (with many parameters) that it loses predictive power for forecasting. In this regard, the one-quarter autoregressive and four-quarter seasonal AR(1)(1)4 model had the lowest Akaike information criterion (AIC), applied to the aggregate real CoE series. We explored the option of applying this model (in a loop) to all industries, but found partial nonstationarity in some industries when using combinations of AR, MA and seasonal AR lags. For this reason, we chose a simple model, with just the four-quarter seasonal AR lag: AR(0)(1)4. The formula for this model is

$$y_t = \phi_0 + \phi_1 y_{t-4} + \varepsilon_t$$

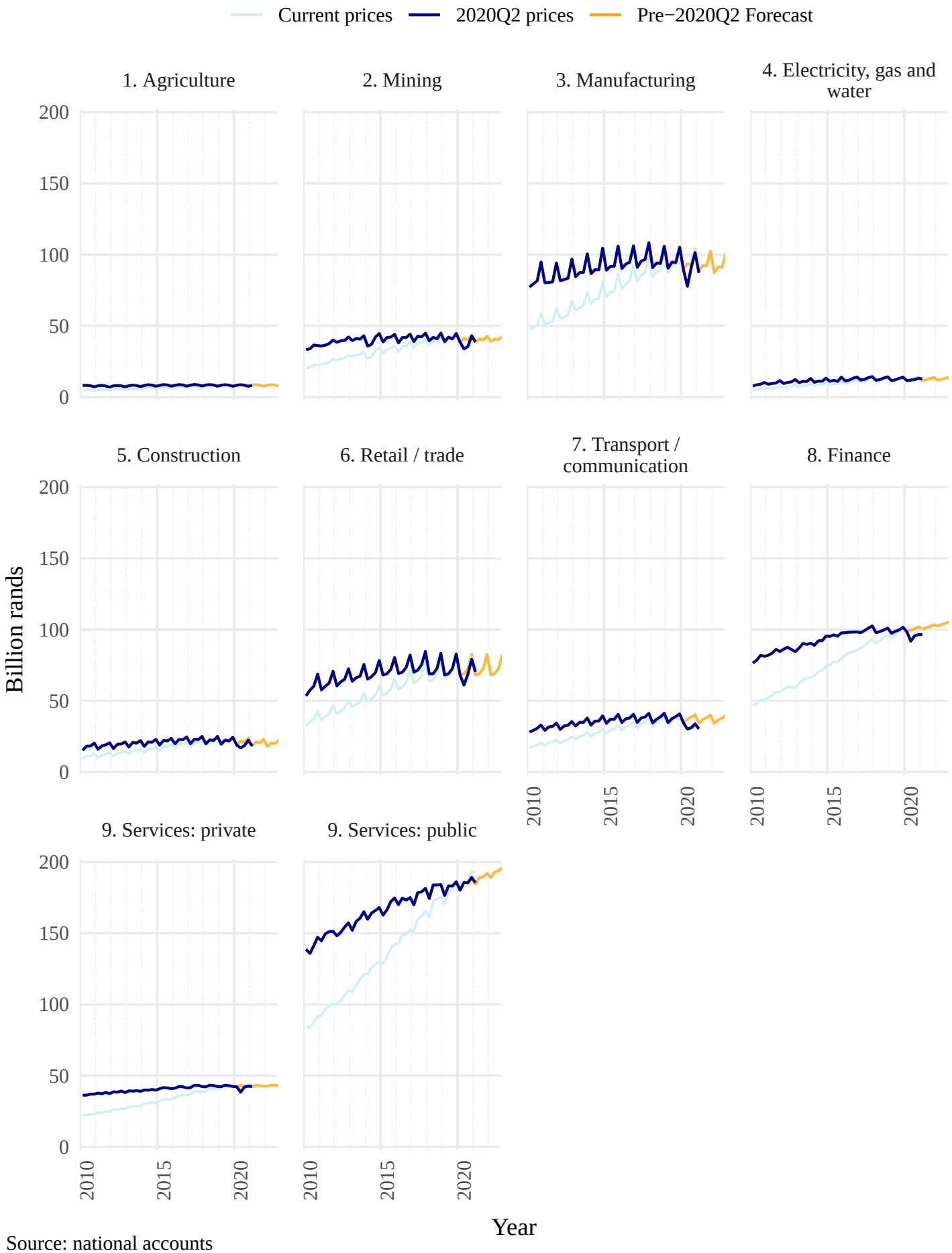
where ε is the error term. With just one four-quarter lagged growth variable (along with a constant), this model combines an overall growth term with a term that captures the recent trend and seasonal variation.

To provide a recovery path in earnings in 2021 and 2022, we fit an AR(2) model to the deviation of actual earnings in 2020 Q2 – 2021 Q1 from our AR(0)(1)4 forecasts, with the coefficients of the first and second lags set to 0.7 and 0.1 respectively. This results in an impulse response function, where the sum of the coefficients ($0.8 < 1$) ensures convergence to the counterfactual over time. We show the results for this projection over 2021 and 2022 in the results section below.

2.2 Results

The results of the regressions for each industry, are in Table 1. The seasonal AR lag is close to one, which means that the growth rate in CoE in each quarter is very similar to the growth rate from four quarters earlier. The intercept

Figure 1: Total compensation of employees, by industry, over time



Source: national accounts

shows the overall growth rate over time that is not captured by the lagged seasonal AR variable. The seasonal AR coefficients are highly significant and close to one, whereas the intercepts are in most cases not significantly different from zero.

Table 1: AR(0)(1)4 regressions of the growth rate of real total compensation of employees, by industry ($n = 40$)

Industry	sar1		intercept	
1. Agriculture	0.983	(0.011)	0.001	(0.037)
2. Mining	0.830	(0.075)	0.009	(0.028)
3. Manufacturing	0.992	(0.006)	0.009	(0.052)
4. Electricity, gas and water	0.898	(0.051)	0.022	(0.048)
5. Construction	0.991	(0.006)	0.015	(0.074)
6. Retail / trade	0.992	(0.006)	0.016	(0.056)
7. Transport / communication	0.978	(0.015)	0.008	(0.040)
8. Finance	0.613	(0.127)	0.007	(0.006)
9. Services: private	0.823	(0.073)	0.005	(0.006)
9. Services: public	0.770	(0.095)	0.007	(0.009)
Total	0.986	(0.010)	0.008	(0.026)

Standard errors in parentheses

We now show the results of the autoregressions graphically. Figure 2 plots the quarter-on-quarter growth rates of real CoE, for the period since 2016 (though the regressions use data from 2010). We superimpose the AR model's fitted values on the actual outcomes to 2020 Q1, and then show both the forecast and realized growth rates for 2020 Q2 (giving the forecast error), and forecast growth rates beyond that. The forecast errors in 2020 Q2 shows which industries had the largest relative losses in total compensation of employees. All sectors other than agriculture show a marked drop in earnings relative to the forecast in the second quarter of 2020.

Table 2 sets out our forecasted earnings levels by industry, together with the recorded outcomes for 2020 Q2 – 2021 Q1 and the associated absolute and proportional differences between the two over time. The first four rows of the post-2021Q1 earnings forecast shows actual outcomes, with projections below the horizontal lines (the recovery is the impulse response model described in the Method section above). The differences over time between the actual outcomes and the pre-2020Q2 counterfactual model are shown as the proportional difference on the left, and as the absolute loss in total earnings on the right.

Figure 3 illustrates the forecast aggregate real earnings levels by industry (in 2020 Q2 prices), outcomes for recent years, and our modelled recovery path as dotted lines. One can observe how the post-2021Q1 modelled recovery path tends towards the pre-2020Q2 counterfactual over time, by design.

Table 2: Earnings loss, due to the lockdown, based on the difference between the forecasted values pre-2020Q2 and post-2021Q1 (values below the horizontal lines are projections)

		Proportional difference (%)		Earnings forecast (billions)		Loss in earnings (billions)
Quarter	Sector	Actual	Projected	Pre-2020Q2	Post-2021Q1	
2020 Q2	1. Agriculture	−0.1		8.7	8.7	0.0
2020 Q3	1. Agriculture	−0.3		8.4	8.4	0.0
2020 Q4	1. Agriculture	−0.1		7.6	7.6	0.0
2021 Q1	1. Agriculture	−0.5		8.3	8.3	0.0

Table 2: Earnings loss, due to the lockdown, based on the difference between the forecasted values pre-2020Q2 and post-2021Q1 (values below the horizontal lines are projections)

		Proportional difference (%)		Earnings forecast (billions)		Loss in earnings (billions)
Quarter	Sector	Actual	Projected	Pre-2020Q2	Post-2021Q1	
2021 Q2	1. Agriculture		−0.4	8.7	8.7	0.0
2021 Q3	1. Agriculture		−0.3	8.4	8.4	0.0
2021 Q4	1. Agriculture		−0.2	7.6	7.6	0.0
2022 Q1	1. Agriculture		−0.2	8.3	8.3	0.0
2022 Q2	1. Agriculture		−0.2	8.7	8.7	0.0
2022 Q3	1. Agriculture		−0.1	8.4	8.4	0.0
2022 Q4	1. Agriculture		−0.1	7.6	7.6	0.0
2020 Q2	2. Mining	−17.9		41.2	33.8	7.4
2020 Q3	2. Mining	−11.9		40.2	35.5	4.8
2020 Q4	2. Mining	−1.0		43.5	43.0	0.4
2021 Q1	2. Mining	0.4		38.6	38.7	−0.2
2021 Q2	2. Mining		0.2	40.8	40.9	−0.1
2021 Q3	2. Mining		0.2	40.1	40.2	−0.1
2021 Q4	2. Mining		0.1	42.8	42.9	−0.1
2022 Q1	2. Mining		0.1	38.9	38.9	−0.0
2022 Q2	2. Mining		0.1	40.8	40.9	−0.0
2022 Q3	2. Mining		0.1	40.3	40.3	−0.0
2022 Q4	2. Mining		0.1	42.6	42.6	−0.0
2020 Q2	3. Manufacturing	−16.9		93.6	77.8	15.9
2020 Q3	3. Manufacturing	−2.5		93.3	91.0	2.3
2020 Q4	3. Manufacturing	−2.3		103.8	101.5	2.4
2021 Q1	3. Manufacturing	−1.3		88.3	87.2	1.1
2021 Q2	3. Manufacturing		−1.1	92.5	91.4	1.0
2021 Q3	3. Manufacturing		−0.9	92.1	91.3	0.8
2021 Q4	3. Manufacturing		−0.7	102.5	101.7	0.8
2022 Q1	3. Manufacturing		−0.6	87.3	86.8	0.5
2022 Q2	3. Manufacturing		−0.5	91.4	90.9	0.5
2022 Q3	3. Manufacturing		−0.4	91.0	90.7	0.4
2022 Q4	3. Manufacturing		−0.3	101.2	100.9	0.3
2020 Q2	4. Electricity, gas and water	−1.2		12.1	11.9	0.1
2020 Q3	4. Electricity, gas and water	−6.2		13.1	12.3	0.8
2020 Q4	4. Electricity, gas and water	−4.6		13.8	13.1	0.6
2021 Q1	4. Electricity, gas and water	9.5		11.7	12.8	−1.1
2021 Q2	4. Electricity, gas and water		6.2	12.2	12.9	−0.8
2021 Q3	4. Electricity, gas and water		5.3	13.1	13.8	−0.7
2021 Q4	4. Electricity, gas and water		4.3	13.8	14.4	−0.6
2022 Q1	4. Electricity, gas and water		3.5	11.9	12.4	−0.4

Table 2: Earnings loss, due to the lockdown, based on the difference between the forecasted values pre-2020Q2 and post-2021Q1 (values below the horizontal lines are projections)

		Proportional difference (%)		Earnings forecast (billions)		Loss in earnings (billions)
Quarter	Sector	Actual	Projected	Pre-2020Q2	Post-2021Q1	
2022 Q2	4. Electricity, gas and water		2.9	12.4	12.7	−0.4
2022 Q3	4. Electricity, gas and water		2.4	13.3	13.6	−0.3
2022 Q4	4. Electricity, gas and water		2.0	13.9	14.2	−0.3
2020 Q2	5. Construction	−21.9		21.7	17.0	4.8
2020 Q3	5. Construction	−12.4		21.1	18.5	2.6
2020 Q4	5. Construction	−5.6		23.7	22.3	1.3
2021 Q1	5. Construction	−0.5		18.4	18.3	0.1
2021 Q2	5. Construction		−0.9	21.1	20.9	0.2
2021 Q3	5. Construction		−0.7	20.5	20.3	0.1
2021 Q4	5. Construction		−0.6	22.9	22.8	0.1
2022 Q1	5. Construction		−0.5	17.9	17.8	0.1
2022 Q2	5. Construction		−0.4	20.5	20.4	0.1
2022 Q3	5. Construction		−0.3	19.9	19.8	0.1
2022 Q4	5. Construction		−0.3	22.3	22.2	0.1
2020 Q2	6. Retail / trade	−11.6		69.0	61.0	8.0
2020 Q3	6. Retail / trade	−5.6		72.6	68.6	4.0
2020 Q4	6. Retail / trade	−4.2		82.7	79.2	3.5
2021 Q1	6. Retail / trade	3.3		68.0	70.3	−2.3
2021 Q2	6. Retail / trade		1.9	69.0	70.3	−1.3
2021 Q3	6. Retail / trade		1.7	72.6	73.8	−1.2
2021 Q4	6. Retail / trade		1.4	82.6	83.8	−1.1
2022 Q1	6. Retail / trade		1.1	68.0	68.8	−0.8
2022 Q2	6. Retail / trade		0.9	69.1	69.7	−0.6
2022 Q3	6. Retail / trade		0.8	72.6	73.2	−0.5
2022 Q4	6. Retail / trade		0.6	82.6	83.1	−0.5
2020 Q2	7. Transport	−18.6		37.1	30.2	6.9
2020 Q3	7. Transport	−19.3		38.5	31.0	7.4
2020 Q4	7. Transport	−16.4		40.3	33.7	6.6
2021 Q1	7. Transport	−11.5		34.2	30.3	4.0
2021 Q2	7. Transport		−9.7	36.8	33.2	3.6
2021 Q3	7. Transport		−8.0	38.1	35.1	3.0
2021 Q4	7. Transport		−6.5	40.0	37.3	2.6
2022 Q1	7. Transport		−5.4	34.0	32.2	1.8
2022 Q2	7. Transport		−4.4	36.5	34.9	1.6
2022 Q3	7. Transport		−3.6	37.8	36.5	1.4
2022 Q4	7. Transport		−3.0	39.6	38.4	1.2

Table 2: Earnings loss, due to the lockdown, based on the difference between the forecasted values pre-2020Q2 and post-2021Q1 (values below the horizontal lines are projections)

		Proportional difference (%)		Earnings forecast (billions)		Loss in earnings (billions)
Quarter	Sector	Actual	Projected	Pre-2020Q2	Post-2021Q1	
2020 Q2	8. Finance	−7.8		99.6	91.8	7.8
2020 Q3	8. Finance	−4.9		100.5	95.6	4.9
2020 Q4	8. Finance	−5.4		102.0	96.5	5.5
2021 Q1	8. Finance	−3.7		100.3	96.5	3.7
2021 Q2	8. Finance		−3.1	101.3	98.1	3.2
2021 Q3	8. Finance		−2.6	102.1	99.5	2.6
2021 Q4	8. Finance		−2.1	103.3	101.2	2.2
2022 Q1	8. Finance		−1.7	102.6	100.8	1.8
2022 Q2	8. Finance		−1.4	103.5	102.0	1.5
2022 Q3	8. Finance		−1.2	104.4	103.1	1.2
2022 Q4	8. Finance		−1.0	105.4	104.4	1.0
2020 Q2	9. Services: private	−11.1		43.1	38.4	4.8
2020 Q3	9. Services: private	−1.8		42.8	42.1	0.8
2020 Q4	9. Services: private	0.5		42.5	42.7	−0.2
2021 Q1	9. Services: private	−0.1		42.4	42.3	0.0
2021 Q2	9. Services: private		−0.0	43.1	43.1	0.0
2021 Q3	9. Services: private		−0.0	42.9	42.9	0.0
2021 Q4	9. Services: private		−0.0	42.7	42.6	0.0
2022 Q1	9. Services: private		−0.0	42.6	42.6	0.0
2022 Q2	9. Services: private		−0.0	43.3	43.3	0.0
2022 Q3	9. Services: private		−0.0	43.1	43.1	0.0
2022 Q4	9. Services: private		−0.0	42.9	42.9	0.0
2020 Q2	9. Services: public	−0.1		185.8	185.7	0.1
2020 Q3	9. Services: public	−0.4		186.1	185.4	0.7
2020 Q4	9. Services: public	0.3		188.7	189.2	−0.5
2021 Q1	9. Services: public	0.6		184.4	185.5	−1.0
2021 Q2	9. Services: public		0.4	189.1	189.9	−0.8
2021 Q3	9. Services: public		0.4	189.7	190.3	−0.7
2021 Q4	9. Services: public		0.3	192.1	192.6	−0.6
2022 Q1	9. Services: public		0.2	189.0	189.5	−0.5
2022 Q2	9. Services: public		0.2	193.1	193.4	−0.4
2022 Q3	9. Services: public		0.2	193.8	194.1	−0.3
2022 Q4	9. Services: public		0.1	196.1	196.3	−0.3
2020 Q2	Total	−9.4		614.2	556.3	57.9
2020 Q3	Total	−4.9		618.3	588.2	30.1
2020 Q4	Total	−3.5		651.7	628.9	22.8
2021 Q1	Total	−0.4		592.8	590.2	2.6

Table 2: Earnings loss, due to the lockdown, based on the difference between the forecasted values pre-2020Q2 and post-2021Q1 (values below the horizontal lines are projections)

		Proportional difference (%)		Earnings forecast (billions)		Loss in earnings (billions)
Quarter	Sector	Actual	Projected	Pre-2020Q2	Post-2021Q1	
2021 Q2	Total		−0.7	616.6	612.6	4.0
2021 Q3	Total		−0.5	620.7	617.6	3.1
2021 Q4	Total		−0.4	653.9	651.2	2.7
2022 Q1	Total		−0.3	595.7	593.6	2.0
2022 Q2	Total		−0.3	619.4	617.6	1.7
2022 Q3	Total		−0.2	623.5	622.1	1.4
2022 Q4	Total		−0.2	656.4	655.2	1.2

Our estimates are that for the overall economy, the loss of earnings to employees in 2020 Q2 was R57.9 billion, or 9.4% of forecast earnings. The total earnings loss was only 4.9% in below trend 2020 Q3. For the first quarter of 2021, we estimate a total earnings loss of 0.4% below trend (or R2.6 billion), which is a near-complete recovery. We project that the earnings loss will fall to 0.2% below trend by 2022 Q4, although this is based on quantitative modelling and carries a large degree of uncertainty.

The industries which were worst affected in quarter two of 2020 in absolute terms were: manufacturing; mining; finance; and trade. The least affected industries were: agriculture; utilities (electricity, gas and water); and government services. In relative (percentage) terms, construction, mining, transport and communications, and manufacturing, were hardest hit. The sizes of the manufacturing and finance sectors amplify the relative contraction in those industries, when looking at the absolute effects.

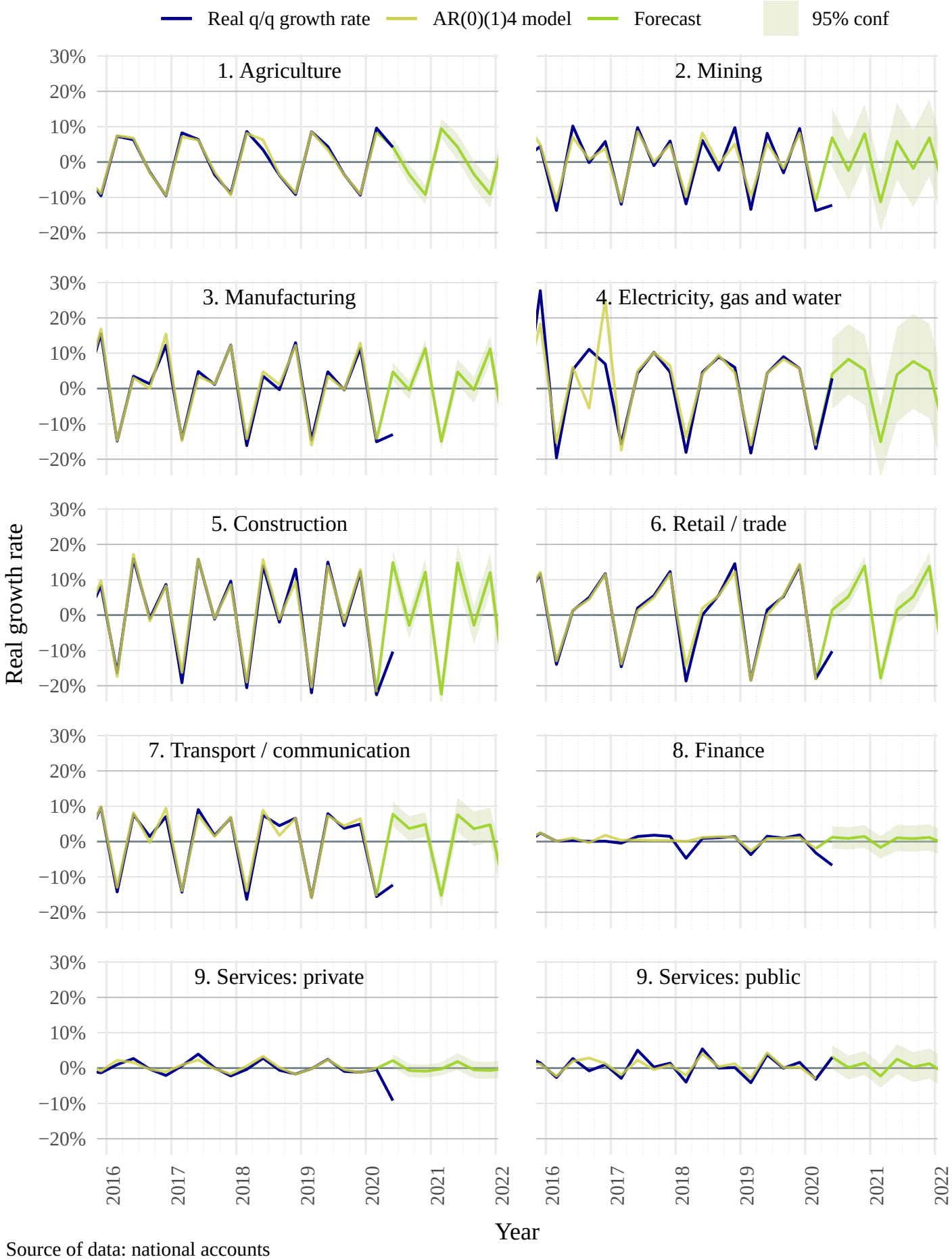
The recovery paths differ considerably. In 2020 Q3, aggregate earnings in manufacturing had a significant recovery, above the forecast trend of growth, and stayed above that level for the following periods. The private services sector also saw a full recovery in earnings in 2020. Construction had a more extended recovery in earnings levels, over quarters three and four, but by 2021 Q1 there had been a near-complete recovery, after the initial negative shock of 22% in 2020 Q2. Wholesale and retail trade, which includes hotels and restaurants and the motor repair trade, also had a more extended recovery, starting off with a 12% shock to aggregate earnings in 2020 Q2 and ending 2020 with aggregate earnings down by 4% in the fourth quarter, before bouncing back 3.3% above trend at the beginning of 2021, or R2.3 billion above the projected level.

Strong recoveries are apparent in all sectors by the end of 2021 Q1. There has been a full recovery in aggregate earnings levels in the total economy up to 2021 Q1, but sectorally there are marked differences. Earnings in the transport and communications sector in 2021 Q1 was 11.5% (R4 billion) lower than the counterfactual forecast, and earnings in the finance sector in 2021 Q1 was still 3.7% (R3.7 billion) lower than the counterfactual, whereas earnings in the utilities sector in 2021 Q1 was apparently R1.1 billion above the counterfactual forecast.

3 Employment by industry post-lockdown

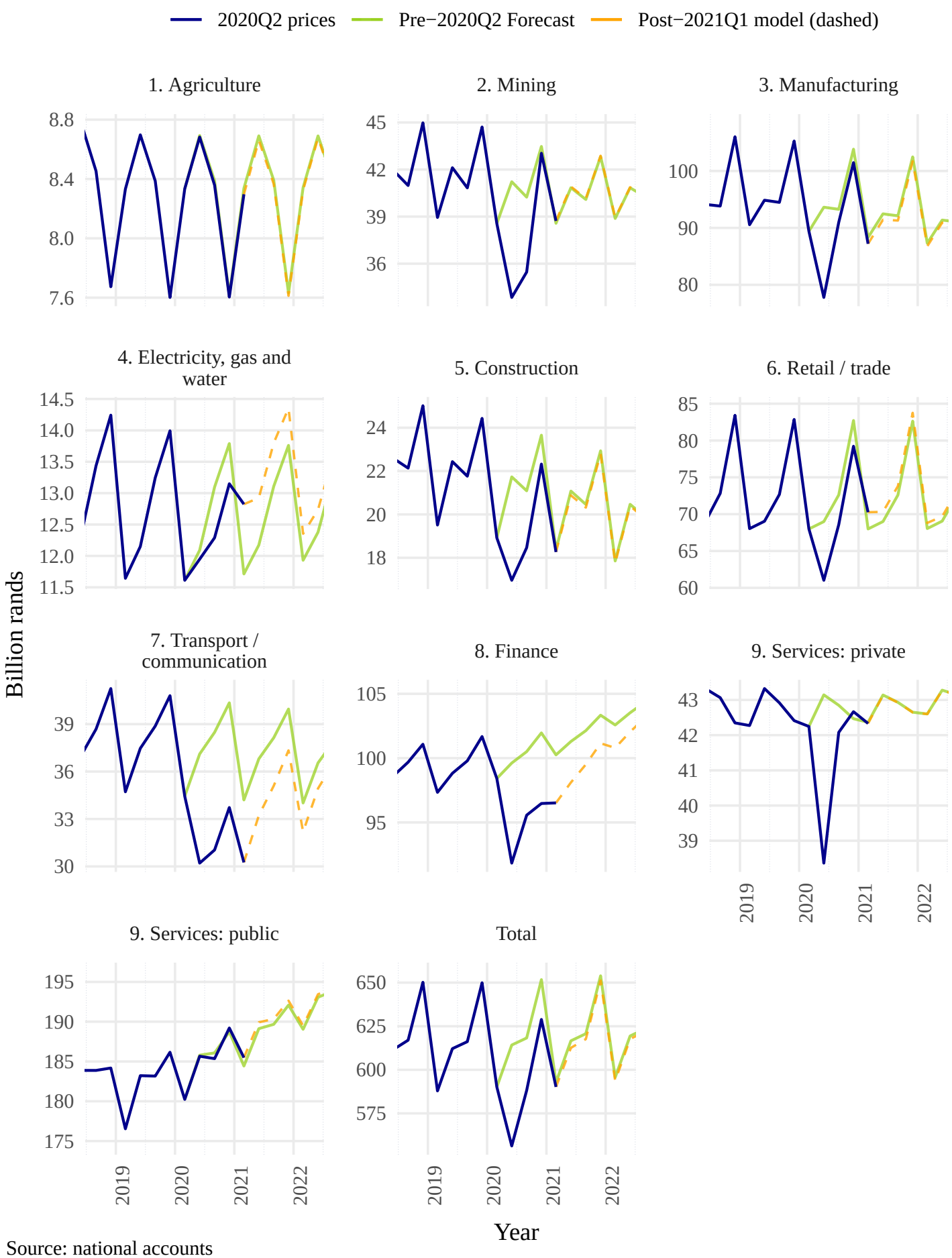
The analysis above illustrates a comparatively rapid recovery in earnings of employees following the 2020 Q2 economic shock. We turn now to the evidence on employment. Our analysis of the employment impact of Covid-19 and the economic shock focuses on total employment by industry, formal and informal, as measured by the QLFS.

Figure 2: Quarter-on-quarter growth rate of real total compensation of employees, by industry, over time



Source of data: national accounts

Figure 3: Total compensation of employees, by industry, over time



Source: national accounts

We note that there may be differences in industry classification and coverage between the QLFS and the national production accounts. They both derive from the SIC, however, and we assume that their coverage is sufficiently similar for comparative analysis.

Several studies have shown that employment losses during the Covid economic downturn were more severe in lower earnings groups, the informal sector and amongst unskilled workers (Köhler, Bhorat, Hill & Stanwix, 2021). Our comparison of the QLFS and national accounts trends supports these findings. Employment fell more sharply than aggregate earnings in 2020 Q2, and its recovery has been slower.

As in our analysis of earnings, we seek to construct counterfactual forecasts of employment by industry based on trends over the 2010 – 2020 Q1 period, thus allowing for declines or increases in employment by industry associated with structural trends in the economy. Counterfactual forecasts enable us to estimate the effect of the economic lockdown shock on employment by industry, by comparison not with employment levels in 2020 Q1 but with employment forecasts based on economic trends. Without controlling for factors other than the time series variable itself, the counterfactual shows what the effect of the lockdown was on reducing aggregate employment, including potential jobs not created which would have been created had there not been a lockdown.

Figure 4 illustrates the variation between industries in QLFS employment trends over the 2010-2020 period, our counterfactual forecasts for the 2020Q2-2022 period and our projected recovery paths for 2021-2022. We multiplied the person weight for the agricultural sector by 1.2 prior to the year 2015, as these QLFS datasets under-weight the employment numbers in that sector for those years (see Donaldson & Horn, 2021). In the Appendix, we illustrate alternative smoothed employment growth trends, separating the underlying trend from cyclical and transitory elements using Hodrick-Prescott (HP) filters. The graphs show that most industries (and employment overall) were increasing in employment over the last decade. Manufacturing employment has declined, and construction declined after a peak around 2017. The finance and business services industries grew strongly in employment levels over the last decade.

3.1 Method

As before, we explored different autoregressive moving average (ARMA) models for explaining the trends in employment. We find that seasonality of employment is not as marked as in the CoE, and varies between industries. There appears to be considerably more statistical noise in the employment time series data than in the national accounts.

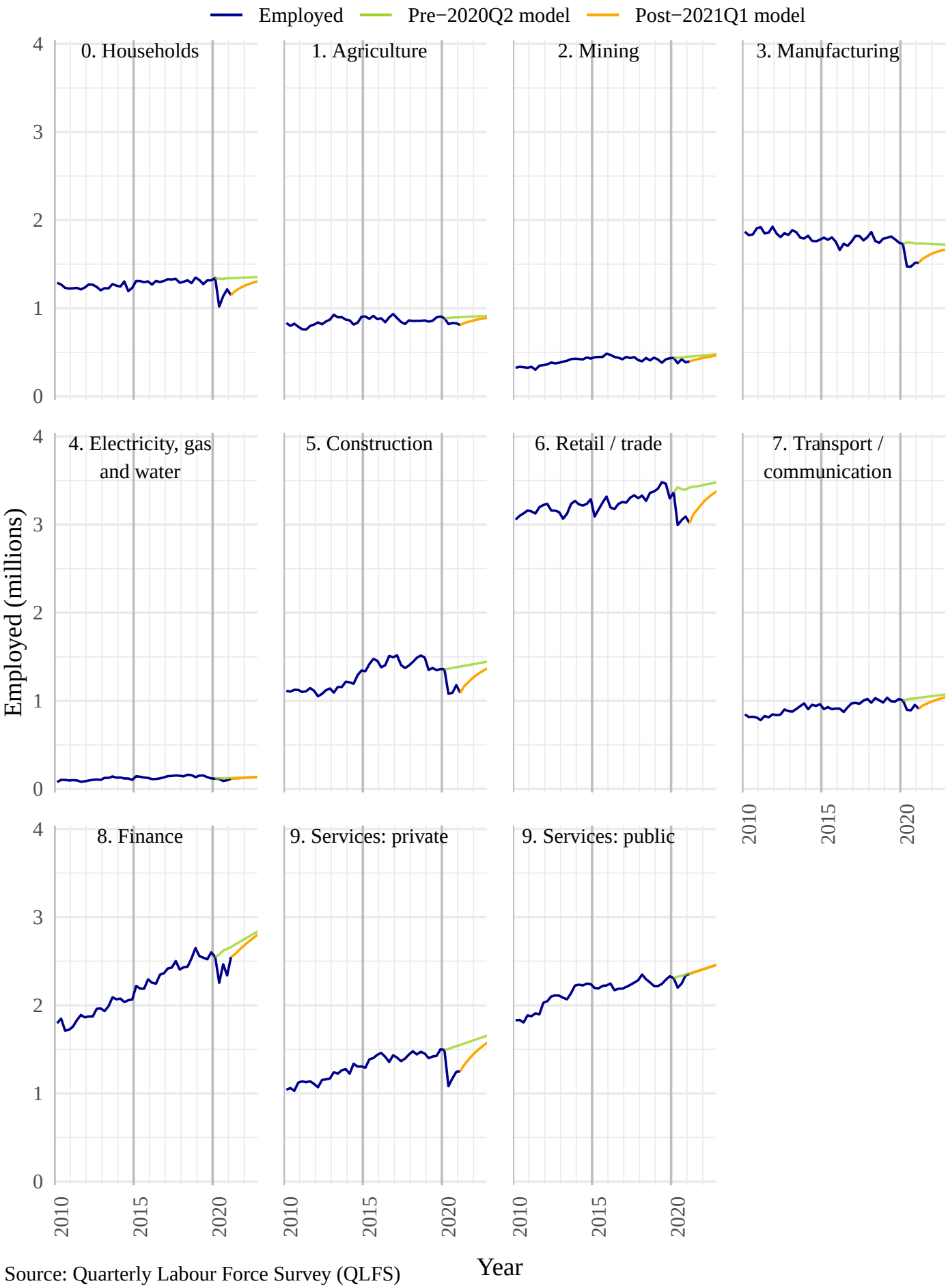
We show the results of our best-performing ARMA models[4] in Table 3, ranked by their AIC values. Autoregression coefficients are estimated using the entire time series (up to 2020 Q1), but only the last few lags are used in forecasting. The AR(2) model gives the best out-of-sample predictions, so we use the AR(2) model to forecast employment post 2020 Q1, also because this is a simple model.

3.2 Employment forecast for 2021 and 2022

In projecting the outlook for employment in 2021 and 2022, we take into account that the covid-19 economic shock has created a "structural break"—both in a statistical time-series sense and in the dynamics of the labour market. Business closures and organizational restructuring in the context of lockdown regulations and the disruption of trade result in discontinuities in economic activity and employment relationships. Uncertainty about the recovery path amplifies employers' hesitation about investment and job creation. The stationary growth-rate analysis applied

[4]On notation, the first bracket indicates the number of quarterly AR lags and moving average lags, the second bracket indicates the number of yearly AR lags and yearly moving average lags, and the final number indicates the number of quarters that defines the gap between seasons. A "moving average" lag is a lag of the error term.

Figure 4: Employment, by industry, over time, with forecasting



Source: Quarterly Labour Force Survey (QLFS)

Table 3: Best-fitting seasonal ARMA models of total employment growth, up to 2020 Q1, out of $5 \times 3 \times 3 \times 3 = 135$ models tested

Model	AIC
AR(2)	−252.38
ARMA(2,2)(1,0)4	−252.22
ARMA(2,2)(0,1)4	−252.17
ARMA(4,1)(0,1)4	−251.58
ARMA(4,0)(0,1)4	−251.48
ARMA(2,1)	−251.35
AR(3)	−251.27
ARMA(5,0)(0,1)4	−250.97

to the available data is unsuitable for projecting the employment recovery path, because the structural break occurs close to the end of the dataset.

As in our projection of earnings recovery paths, we therefore adopt a naïve approach to modeling the employment recovery over 2021 and 2022.We extend the lag in employment recovery behind the recovery of earnings into 2021 and 2022, based on a simple 'impulse response' function modeled as an AR(2) response to the deviation of the employment level from the counterfactual in 2020 Q4 – 2021 Q1 onwards, with the coefficients on the first and second AR lags set to 0.7 and 0.1 respectively. As in our CoE projections, the sum of the coefficients is less than one, so the forecasts tend towards the counterfactual over time. This recovery path can be seen in our results section below.

Though we anticipate that the economy will recover, we attach no particular predictive power to our assumed earnings and employment recovery paths. We know that the covid-19 virus is an exogenous economic shock, and even if its impact on social behaviour and the regulatory environment persists this will be accompanied by economic adaptation, learning, change and progress (not only through vaccines, but also through behavioural and technological changes in workplaces and social interaction). There may be policy responses or initiatives, too, that affect the employment recovery path, either positively or negatively.

3.3 Results

The AR(2) regression coefficients are given in Table 4. The intercept terms are close to zero (though in one or two cases this is still a sizeable partial annual growth rate). "ar1" stands for the lagged previous quarter and "ar2" stands for the lag of two quarters previous. These are mostly negative, which means growth in quarter t is negatively correlated with growth in quarters $t-1$ and $t-2$. The low significance of the coefficients is indicative of statistical noise in the quarterly employment data, comparatively low fitted growth trends and reversion to trend following prior period deviations. Only three coefficients are needed per industry for forecasting purposes, which is a fairly simple structure, while providing a more advanced method compared to simply using 2020 Q1 as the baseline.

Table 5 sets out our forecast employment levels by industry, the reported QLFS outcomes for 2020 Q2 – 2021 Q1 and our projected recovery paths for the period to 2022 Q4. The pre-2020Q2 forecast is derived by applying the projected growth rates over time. Without controlling for other factors, the results in the right-hand column quantify the amount of additional unemployment since the lockdown started. In the post-2021Q1 employment forecast column, the values for 2020 and 2021 Q1 are actual outcomes, and the values below the horizontal lines are projections. In the right-most column where we show additional unemployment, the calculation is simply the difference between the two previous columns, the pre-2020Q2 AR(2) model and the post-2021Q1 column. Figure 5

Table 4: AR(2) regressions of the growth rate of the level of employment, by industry ($n = 40$)

Industry	ar1		ar2		intercept	
0. Private households	– 0.440	(0.1505)	– 0.332	(0.1497)	0.002	(0.0022)
1. Agriculture	– 0.066	(0.1582)	– 0.154	(0.1567)	0.002	(0.0047)
2. Mining	– 0.418	(0.1553)	– 0.125	(0.1538)	0.009	(0.0050)
3. Manufacturing	– 0.236	(0.1402)	– 0.454	(0.1371)	– 0.001	(0.0021)
4. Electricity, gas and water	– 0.178	(0.1722)	– 0.090	(0.1718)	0.015	(0.0143)
5. Construction	0.020	(0.1540)	– 0.193	(0.1515)	0.006	(0.0050)
6. Retail / trade	– 0.192	(0.1482)	– 0.370	(0.1569)	0.003	(0.0019)
7. Transport / communication	– 0.533	(0.1557)	– 0.227	(0.1540)	0.006	(0.0029)
8. Finance	– 0.249	(0.1534)	– 0.276	(0.1707)	0.010	(0.0029)
9. Services: private	– 0.376	(0.1530)	– 0.212	(0.1555)	0.010	(0.0033)
9. Services: public	– 0.014	(0.1562)	0.106	(0.1576)	0.006	(0.0033)
Total	– 0.050	(0.1493)	– 0.334	(0.1509)	0.004	(0.0011)

Standard errors in parentheses

shows graphically what is shown in Table 5.

Table 5: Additional unemployment, due to the lockdown, based on the difference between the forecasted values pre-2020Q2 and post-2021Q1 (values below the horizontal lines are projections)

		Pre-2020Q2 AR model	Post-2020Q4 impulse response (% difference)		Employment forecast (thousands)		Additional **unemployment** (thousands)
Quarter	Sector	q/q growth (%)	Actual	Projected	Pre-2020Q2	Post-2021Q1	
2020 Q2	0. Households	−0.6	−23.6		1334.6	1019.1	315.5
2020 Q3	0. Households	−0.1	−14.7		1333.3	1136.7	196.5
2020 Q4	0. Households	0.5	−9.4		1340.0	1214.3	125.7
2021 Q1	0. Households	0.1	−14.3		1341.2	1149.1	192.1
2021 Q2	0. Households	0.1		−11.0	1342.1	1194.9	147.1
2021 Q3	0. Households	0.2		−9.1	1345.0	1222.5	122.5
2021 Q4	0. Households	0.2		−7.5	1347.1	1246.4	100.6
2022 Q1	0. Households	0.1		−6.1	1348.9	1266.1	82.8
2022 Q2	0. Households	0.2		−5.0	1351.1	1282.9	68.2
2022 Q3	0. Households	0.2		−4.1	1353.2	1297.1	56.1
2022 Q4	0. Households	0.2		−3.4	1355.3	1309.1	46.2
2020 Q2	1. Agriculture	0.3	−7.7		889.6	820.8	68.8
2020 Q3	1. Agriculture	0.6	−7.1		894.9	831.6	63.3
2020 Q4	1. Agriculture	0.2	−7.6		896.8	828.8	68.1
2021 Q1	1. Agriculture	0.2	−9.9		898.5	809.9	88.6
2021 Q2	1. Agriculture	0.2		−7.7	900.7	831.7	69.0
2021 Q3	1. Agriculture	0.2		−6.3	903.0	845.7	57.3
2021 Q4	1. Agriculture	0.2		−5.2	905.1	858.0	47.2
2022 Q1	1. Agriculture	0.2		−4.3	907.3	868.5	38.9
2022 Q2	1. Agriculture	0.2		−3.5	909.5	877.5	32.0

Table 5: Additional unemployment, due to the lockdown, based on the difference between the forecasted values pre-2020Q2 and post-2021Q1 (values below the horizontal lines are projections)

		Pre-2020Q2 AR model	Post-2020Q4 impulse response (% difference)		Employment forecast (thousands)		Additional **unemployment** (thousands)
Quarter	Sector	q/q growth (%)	Actual	Projected	Pre-2020Q2	Post-2021Q1	
2022 Q3	1. Agriculture	0.2		−2.9	911.7	885.3	26.4
2022 Q4	1. Agriculture	0.2		−2.4	913.9	892.2	21.7
2020 Q2	2. Mining	0.5	−14.5		439.2	375.6	63.7
2020 Q3	2. Mining	1.0	−4.9		443.5	421.9	21.6
2020 Q4	2. Mining	0.9	−13.6		447.3	386.3	61.0
2021 Q1	2. Mining	0.8	−12.0		451.1	396.9	54.2
2021 Q2	2. Mining	0.9		−9.8	455.0	410.5	44.5
2021 Q3	2. Mining	0.9		−8.0	458.9	421.9	36.9
2021 Q4	2. Mining	0.9		−6.6	462.8	432.2	30.6
2022 Q1	2. Mining	0.9		−5.4	466.8	441.4	25.3
2022 Q2	2. Mining	0.9		−4.5	470.8	449.7	21.0
2022 Q3	2. Mining	0.9		−3.7	474.8	457.4	17.4
2022 Q4	2. Mining	0.9		−3.0	478.9	464.4	14.4
2020 Q2	3. Manufacturing	0.9	−15.7		1746.5	1473.1	273.4
2020 Q3	3. Manufacturing	−0.1	−15.7		1745.4	1471.4	274.1
2020 Q4	3. Manufacturing	−0.6	−12.7		1734.6	1514.0	220.6
2021 Q1	3. Manufacturing	−0.0	−12.5		1734.1	1517.3	216.8
2021 Q2	3. Manufacturing	0.1		−10.0	1735.5	1561.6	173.9
2021 Q3	3. Manufacturing	−0.2		−8.3	1731.9	1588.7	143.1
2021 Q4	3. Manufacturing	−0.2		−6.8	1728.5	1611.2	117.3
2022 Q1	3. Manufacturing	−0.1		−5.6	1727.4	1631.1	96.4
2022 Q2	3. Manufacturing	−0.1		−4.6	1725.7	1646.6	79.1
2022 Q3	3. Manufacturing	−0.2		−3.8	1723.1	1658.2	64.9
2022 Q4	3. Manufacturing	−0.1		−3.1	1720.9	1667.7	53.3
2020 Q2	4. Electricity, gas & water	3.4	−5.5		119.5	112.9	6.6
2020 Q3	4. Electricity, gas & water	1.6	−25.5		121.4	90.4	31.0
2020 Q4	4. Electricity, gas & water	1.3	−19.4		123.0	99.1	23.8
2021 Q1	4. Electricity, gas & water	1.5	−7.9		124.8	115.0	9.8
2021 Q2	4. Electricity, gas & water	1.5		−7.4	126.7	117.3	9.4
2021 Q3	4. Electricity, gas & water	1.5		−6.0	128.6	120.9	7.7
2021 Q4	4. Electricity, gas & water	1.5		−4.9	130.5	124.0	6.4
2022 Q1	4. Electricity, gas & water	1.5		−4.1	132.4	127.0	5.4
2022 Q2	4. Electricity, gas & water	1.5		−3.3	134.4	129.9	4.5
2022 Q3	4. Electricity, gas & water	1.5		−2.7	136.4	132.6	3.7
2022 Q4	4. Electricity, gas & water	1.5		−2.3	138.4	135.3	3.1

Table 5: Additional unemployment, due to the lockdown, based on the difference between the forecasted values pre-2020Q2 and post-2021Q1 (values below the horizontal lines are projections)

			Post-2020Q4 impulse response (% difference)		Employment forecast (thousands)		Additional **unemployment** (thousands)
Quarter	Sector	Pre-2020Q2 AR model q/q growth (%)	Actual	Projected	Pre-2020Q2	Post-2021Q1	
2020 Q2	5. Construction	0.5	−20.8		1363.5	1079.7	283.9
2020 Q3	5. Construction	0.7	−20.5		1373.6	1091.7	281.9
2020 Q4	5. Construction	0.6	−14.7		1381.7	1178.4	203.3
2021 Q1	5. Construction	0.5	−21.6		1389.1	1089.6	299.5
2021 Q2	5. Construction	0.6		−16.6	1397.0	1165.6	231.4
2021 Q3	5. Construction	0.6		−13.8	1405.0	1211.8	193.2
2021 Q4	5. Construction	0.6		−11.3	1413.0	1253.6	159.4
2022 Q1	5. Construction	0.6		−9.3	1421.0	1289.3	131.8
2022 Q2	5. Construction	0.6		−7.6	1429.1	1320.2	108.9
2022 Q3	5. Construction	0.6		−6.3	1437.2	1347.2	90.0
2022 Q4	5. Construction	0.6		−5.1	1445.4	1371.0	74.4
2020 Q2	6. Retail / trade	1.8	−12.5		3424.0	2995.5	428.5
2020 Q3	6. Retail / trade	−0.7	−10.3		3400.6	3051.0	349.7
2020 Q4	6. Retail / trade	−0.1	−9.0		3396.3	3091.9	304.4
2021 Q1	6. Retail / trade	0.7	−11.8		3419.5	3017.2	402.2
2021 Q2	6. Retail / trade	0.3		−9.1	3430.5	3117.3	313.2
2021 Q3	6. Retail / trade	0.1		−7.6	3433.7	3173.8	259.9
2021 Q4	6. Retail / trade	0.3		−6.2	3442.9	3229.1	213.8
2022 Q1	6. Retail / trade	0.3		−5.1	3454.0	3277.7	176.3
2022 Q2	6. Retail / trade	0.2		−4.2	3462.5	3317.2	145.2
2022 Q3	6. Retail / trade	0.2		−3.4	3470.8	3351.2	119.6
2022 Q4	6. Retail / trade	0.3		−2.8	3480.2	3381.6	98.5
2020 Q2	7. Transport	1.1	−11.7		1016.4	897.6	118.8
2020 Q3	7. Transport	0.7	−12.8		1023.9	892.5	131.4
2020 Q4	7. Transport	0.3	−7.2		1027.3	953.7	73.6
2021 Q1	7. Transport	0.6	−11.8		1033.8	912.1	121.7
2021 Q2	7. Transport	0.6		−9.0	1039.6	946.5	93.1
2021 Q3	7. Transport	0.5		−7.4	1045.2	967.3	77.9
2021 Q4	7. Transport	0.6		−6.1	1051.1	986.9	64.2
2022 Q1	7. Transport	0.6		−5.0	1056.9	1003.9	53.1
2022 Q2	7. Transport	0.6		−4.1	1062.8	1018.9	43.9
2022 Q3	7. Transport	0.6		−3.4	1068.7	1032.5	36.2
2022 Q4	7. Transport	0.6		−2.8	1074.7	1044.7	29.9
2020 Q2	8. Finance	1.1	−12.4		2575.3	2254.9	320.4
2020 Q3	8. Finance	1.8	−5.9		2620.5	2465.2	155.3
2020 Q4	8. Finance	0.7	−11.4		2639.2	2338.7	300.5

Table 5: Additional unemployment, due to the lockdown, based on the difference between the forecasted values pre-2020Q2 and post-2021Q1 (values below the horizontal lines are projections)

		Pre-2020Q2 AR model	Post-2020Q4 impulse response (% difference)		Employment forecast (thousands)		Additional **unemployment** (thousands)
Quarter	Sector	q/q growth (%)	Actual	Projected	Pre-2020Q2	Post-2021Q1	
2021 Q1	8. Finance	0.8	−4.2		2660.1	2548.7	111.4
2021 Q2	8. Finance	1.1		−4.1	2688.4	2579.0	109.4
2021 Q3	8. Finance	1.0		−3.3	2714.5	2625.8	88.7
2021 Q4	8. Finance	0.9		−2.7	2739.5	2665.7	73.8
2022 Q1	8. Finance	1.0		−2.2	2765.8	2704.6	61.2
2022 Q2	8. Finance	1.0		−1.8	2792.4	2741.6	50.8
2022 Q3	8. Finance	1.0		−1.5	2819.0	2776.8	42.1
2022 Q4	8. Finance	1.0		−1.2	2845.8	2810.9	34.9
2020 Q2	9. Services: private	0.7	−28.0		1501.7	1081.1	420.5
2020 Q3	9. Services: private	1.4	−23.2		1523.1	1170.4	352.7
2020 Q4	9. Services: private	0.9	−18.9		1536.3	1246.2	290.1
2021 Q1	9. Services: private	0.9	−19.3		1550.3	1250.8	299.5
2021 Q2	9. Services: private	1.0		−15.4	1566.1	1324.7	241.4
2021 Q3	9. Services: private	1.0		−12.7	1581.2	1380.1	201.1
2021 Q4	9. Services: private	1.0		−10.4	1596.4	1429.7	166.8
2022 Q1	9. Services: private	1.0		−8.6	1612.0	1473.6	138.4
2022 Q2	9. Services: private	1.0		−7.1	1627.6	1512.8	114.8
2022 Q3	9. Services: private	1.0		−5.8	1643.4	1548.2	95.2
2022 Q4	9. Services: private	1.0		−4.8	1659.4	1580.4	79.0
2020 Q2	9. Services: public	0.7	−5.4		2324.4	2199.6	124.9
2020 Q3	9. Services: public	0.4	−3.8		2334.4	2245.9	88.5
2020 Q4	9. Services: public	0.6	−0.3		2348.6	2340.5	8.1
2021 Q1	9. Services: public	0.6	−0.3		2362.1	2355.1	7.0
2021 Q2	9. Services: public	0.6		−0.2	2376.1	2370.4	5.8
2021 Q3	9. Services: public	0.6		−0.2	2390.1	2385.4	4.8
2021 Q4	9. Services: public	0.6		−0.2	2404.3	2400.3	3.9
2022 Q1	9. Services: public	0.6		−0.1	2418.5	2415.3	3.3
2022 Q2	9. Services: public	0.6		−0.1	2432.8	2430.1	2.7
2022 Q3	9. Services: public	0.6		−0.1	2447.2	2445.0	2.2
2022 Q4	9. Services: public	0.6		−0.1	2461.7	2459.9	1.8
2020 Q2	Total	0.5	−14.3		16598.6	14223.4	2375.2
2020 Q3	Total	0.7	−11.6		16711.7	14776.3	1935.4
2020 Q4	Total	0.4	−10.0		16777.1	15104.8	1672.3
2021 Q1	Total	0.4	−10.4		16837.1	15086.5	1750.6
2021 Q2	Total	0.5		−8.3	16913.9	15514.3	1399.6
2021 Q3	Total	0.5		−6.8	16992.1	15831.2	1160.9

Table 5: Additional unemployment, due to the lockdown, based on the difference between the forecasted values pre-2020Q2 and post-2021Q1 (values below the horizontal lines are projections)

		Pre-2020Q2 AR model	Post-2020Q4 impulse response (% difference)		Employment forecast (thousands)		Additional **unemployment** (thousands)
Quarter	Sector	q/q growth (%)	Actual	Projected	Pre-2020Q2	Post-2021Q1	
2021 Q4	Total	0.4		−5.6	17065.0	16107.7	957.3
2022 Q1	Total	0.4		−4.6	17138.2	16348.1	790.1
2022 Q2	Total	0.4		−3.8	17213.6	16561.5	652.1
2022 Q3	Total	0.4		−3.1	17289.2	16751.0	538.2
2022 Q4	Total	0.4		−2.6	17364.5	16920.4	444.1

Figures 4 and 5 graphically show our forecast counterfactuals in green, and illustrate the sharp drops in employment levels in 2020 (blue lines) due to the lockdown and our post-2021 Q1 predicted recovery paths (in orange). The difference between the green line and the actual outcomes (dark blue) show additional unemployment due to the lockdown and economic shock, including foregone jobs that would have been created in the absence of the lockdown. These aggregate projections are nett of labour market churn, that is, transitions between employment states, or people people moving in and out of formal or informal employment.

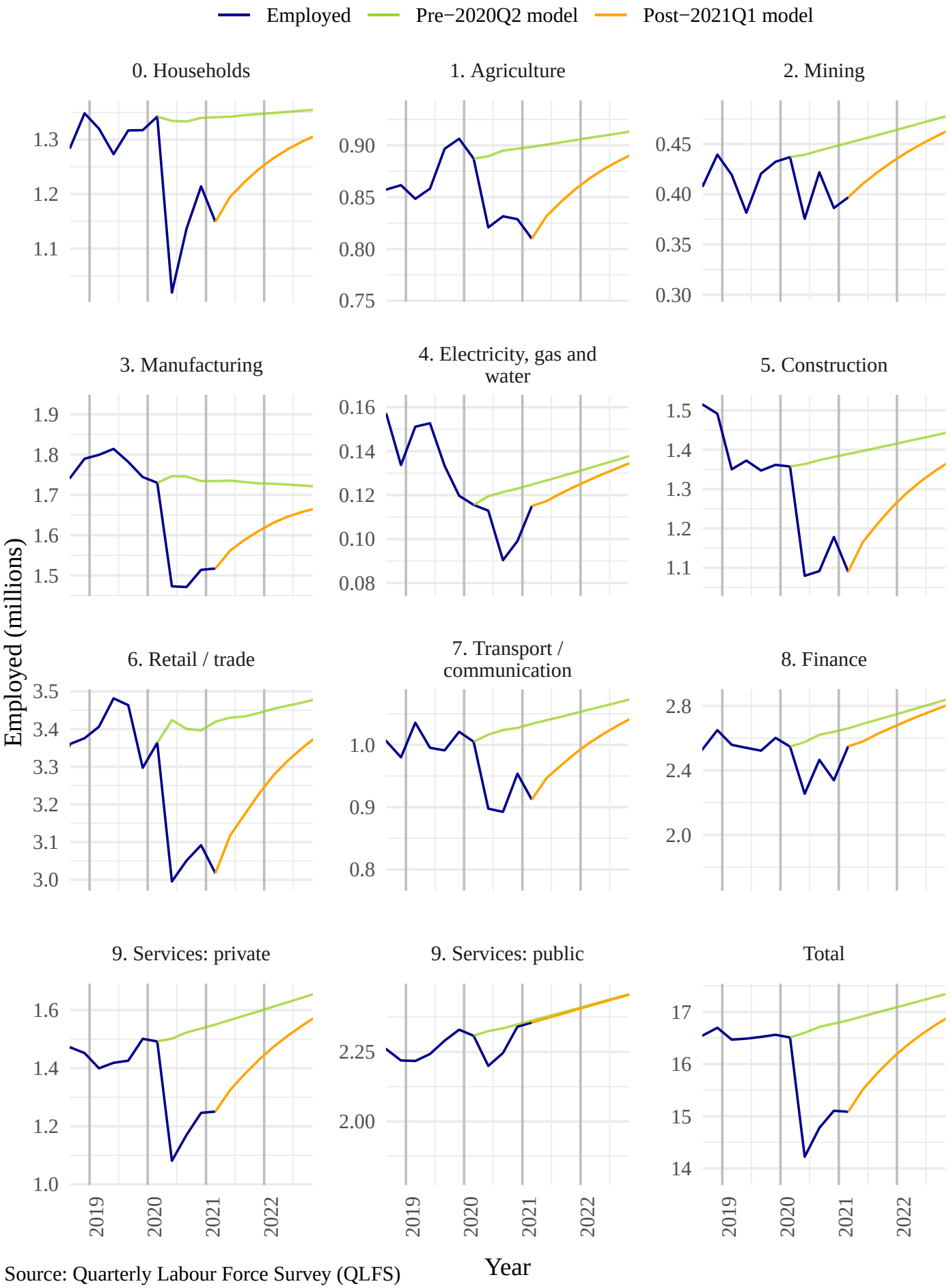
3.4 Interpretation

Overall, the reported QLFS outcomes for 2020 Q2 – 2021 Q1 show that the employment recovery has lagged behind compensation of employees in all sectors.[5] In 2020 Q2, when the lockdown started, employment levels were down by 2.4 million compared to the counterfactual, or 14.3%, and by the fourth quarter, were still down by 1.7 million, ending up with a loss in Q4 about 61% of the initial loss. In comparison, aggregate earnings recovered from a R58 billion quarterly reduction to a R23 billion quarterly reduction, ending up with a loss in Q4 only about 29% of the initial loss. The difference between the earnings recovery and the employment recovery were even more stark by 2021 Q1, with total earnings exhibiting a 96% recovery, but employment levels still stubbornly low at a 26% recovery against the counterfactual. This reinforces evidence from other analysis on the National Income Dynamics Study Coronavirus Rapid Mobile Survey (NIDS-CRAM) that suggests that employment losses were more concentrated amongst lower-income earners and that inequality increased during the covid-19 period (Köhler, Bhorat, Hill & Stanwix, 2021). Earnings data from the 2020 QLFS that might corroborate these findings are not yet available—these are released by StatsSA in the Labour Market Dynamics in South Africa (LMDSA) dataset with a two-year delay. NIDS-CRAM has suggested a stronger rebound in employment than the QLFS suggested (Bassier, Budlender & Kerr, 2021). However, Daniels, Ingle and Brophy (2021) explain that this can be due to differences in the reference periods of the surveys, as the QLFS used a reference week, whereas NIDS-CRAM used a reference month for each survey wave, leading to higher estimates of employment levels. NIDS-CRAM thus includes some irregular workers who are otherwise captured as unemployed in the QLFS. Also, because the QLFS sampling occurs across lockdown levels, the QLFS is better suited to analysing aggregate labour force states quarter-by-quarter and annually, whereas the strength of NIDS-CRAM is to show movements of individual workers within shorter time frames.

The private services, domestic household employment and construction industries had the biggest reductions in aggregate employment (relative to their size) in 2020 Q2, with manufacturing and mining also experiencing signif-

[5]There is some doubt about the reliability of QLFS employment measurement over the past year. Due in part to covid-related restrictions, StatsSA surveys were curtailed and the QLFS sample declined by about 30% from 2020 Q2 to less than 0.1% of the population.

Figure 5: Employment forecasting models, pre-2020Q2 and post-2020Q4



Source: Quarterly Labour Force Survey (QLFS)

icant reductions. In absolute terms, the following industries had the biggest reductions in employment: wholesale and retail trade, private services, finance, and to a lesser degree households and manufacturing.

The finance sector saw the biggest absolute recovery in employment in 2020 Q3 although the recovery after that period has not been as rapid. The household sector saw a significant recovery in 2020, from a reduction in employment of 315 thousand due to the lockdown in the second quarter, down to only 126 thousand by the end of the year. For employment in the electricity, gas and water industry, the QLFS data show little impact in quarter two, but a large reduction in employment (21.2%) in the third quarter, and a partial recovery by the start of 2021—though it should be noted that this is a small sector subject to survey coverage limitations.

4 Implications and policy considerations

Government's primary response to the impact of the covid-19 lockdown on the labour market was to introduce the Covid-19 Temporary Employee/Employer Relief Scheme (C19-TERS), to protect vulnerable employees from losing their jobs in the context of the lockdown's restrictions on economic activity. The relief programme assisted businesses whose operations were closed or partially closed during the lockdown period by contributing UIF benefit payments to affected workers, calculated on a sliding scale and subject to a R3500 a month equivalent minimum earnings level. Despite being extended several times, at the time of writing to 15 March 2021, with benefit payments going to over 4 million employees in its first phase, the earnings relief programme has not prevented job losses that have been deeper and have extended longer than the overall decline in earnings.

The UIF covid-19 TERS programme has paid out over R60 billion in benefits—roughly equivalent to the overall earnings loss in the first three months of the covid lockdown. But benefit payments have lagged behind relief requirements: payments during the April–June 2020 period were mainly paid a month or more in arrears, and for the July–August period payments only began in September. Payments for August-September were mainly made in November, and September–October payments were first made in December. The programme has suffered from protracted administrative difficulties and disagreements on interpreting the regulations. Non-compliance of smaller employers and households with UIF contribution requirements complicated their participation.

One particular controversy in the covid-TERS programme seems likely to have exacerbated the employment problem. Many employers, in the initial phase of covid-TERS, continued to pay their workers either full or reduced rates on the understanding that they would be partially reimbursed by the UIF. But there was confusion about whether the TERS benefit was a supplement to payments made by employers or a reimbursement, and about the tax and accounting treatment of separate wage and UIF payments. This experience (and associated inspections and audit investigations) together with uncertainty about the continuation of the TERS programme beyond its first phase must have encouraged some employers in lockdown-affected industries to terminate work contracts rather than continue with part-time or furloughed arrangements.

For September–October 2020, the number of approved covid-TERS benefit claims was down to just over 500 000, though the QLFS suggests that there were still 1.5 million formally employed workers out of work. TERS benefits were paid without reducing accrued UIF credits, and so UIF contributors who lost their jobs became entitled to normal unemployment benefits. It is unclear at the time of writing what the overall cost to the UIF will be, but the data set out in Table 5 above suggest that the 2020–2021 period will see substantially higher UIF claims than usual, in addition to the increased expenditure associated with the C19-TERS programme. If, as in some European countries, the labour market still has to adjust to significant numbers of workers coming off the C19-TERS furlough scheme, unemployment rates might yet rise further (Williams, 2020).[6]

[6]It has been argued elsewhere that temporary furlough schemes *defer* reductions in labour demand associated with permanent shifts in industry ("The zombification of Britain…", 2020; "Pain relief…", 2020). When the economy recovers, the demand in some industries will be

There are other potential impacts on social insurance and the public finances to consider. Covid-19 and the lockdown are likely to accelerate changes towards more flexible work and remuneration arrangements, higher levels of self-employment and work from home, and perhaps realignments in the balance between work, leisure and cooperative activities. Social insurance design and regulations will need to adapt to these changes, and there may be implications also for tax systems and social service delivery. In response to the lockdown, firms have moved office space out of city centres, towards suburbs and more rural areas, as remote working becomes more popular ("Bartleby: how the pandemic…", 2020). The demand for secondary downstream services in city centres is decreased (such as cafés or hair salons), so there is a geographical migration of job opportunities out of city centres, disrupting the labour market. Kerr and Thornton (2020) show how the security of jobs that involve close proximity to other people, or that cannot be performed remotely, have been at risk. Conversely, other industries are growing, such as e-commerce, and artificial intelligence, although IT jobs are on the one side of growing inequality.

Whether C19-TERS should be extended further, and for what categories of employees and firms, has been under review by a NEDLAC task team. There is a clear case for relief for businesses directly affected by lockdown regulations, and employees in isolation or quarantine. But an extended lockdown impacts on trade and economic activity more broadly than the reach of regulations, and it is difficult to demarcate lockdown impacts precisely. Consideration might therefore need to be given to alternative business and employment support measures, aimed at strengthening economic recovery alongside continuing pandemic response interventions. As with some European furlough schemes (Williams, 2020), the Unemployment Insurance Fund (UIF) has progressively restricted payment of TERS benefits more narrowly as the lockdown regulations have changed. As C19-TERS ends, some vulnerable jobs transition from subsidized furloughed jobs to unemployment. However, historically, unemployment insurance claims following a recession have been far more muted than the spike in unemployment statistics, due to incomplete UIF coverage, irregular or part-time work, or new entrants who haven't accumulated UIF credits.

If South African employment has been negatively affected by covid-19 and the economic slowdown to the extent indicated by the QLFS surveys, and if this trend seems likely to persist, economic recovery will need to be accompanied by policy responses that counter and mitigate this impact. Account will also have to be taken of the disruption of schooling and vocational education and training programmes over this period, and the associated damage to career prospects and the transition to work of this cohort of young people.

Labour market activation can be approached from both the supply and demand sides. Much has been learnt in recent years about facilitating the transition from school to work, and providing young people with skills aligned to their abilities and interests and relevant to likely job opportunities. Government employment programmes and private sector internship programmes could continue to be scaled up. But these are administration-intensive initiatives, and so there are institutional limits to the pace of their expansion.

The simplest approach to raising the demand for labour is to lower its cost. If this is to be done without undermining minimum wage and basic labour standards, then it should take the form of a subsidy on low wages, implemented through the tax system. This has, in effect, been piloted through the existing youth employment incentive—the administrative apparatus is in place to extend this to all low-wage earners, in all industries, subject to compliance of employers with basic labour standards and social insurance participation.

5 Conclusion

Our review of the national production accounts and the QLFS employment data indicates that while aggregate compensation of employees has recovered strongly since the 2020 Q2 covid-19 economic shock, employment has

permanently reduced, such as in travel, and (geographically) in city centres. It is unclear to what extent this might apply in South African circumstances.

lagged behind. After a 9.4% reduction in total earnings and a 14.3% reduction in total employment in quarter two, earnings saw a recovery in 2020 at twice the rate of the recovery in employment. By 2020 Q4, total earnings was 3.5% below our pre-covid-19 counterfactual growth path whereas total employment was still 10.0% lower. The data suggests an even worse outcome for inequality by 2021 Q1, with a near-complete recovery in earnings (0.4% lower than the counterfactual) and persistent unemployment (with employment levels 10.4% below the counterfactual). This translates into a recovery in earnings (from the 2020 Q2 recession) which is 3.6 times greater than the recovery in employment, as of the beginning of 2021. Only in the finance, utilities and in government services has employment returned, by the beginning of 2021, to the pre-covid-19 employment path.

These trends suggest that the recovery in earnings amongst higher-income earners has been near complete, while employment losses have been greatest amongst lower income workers. Inequality of earnings has intensified. Our analysis suggests that there will be substantial costs to the UIF in unemployment claims in 2021, though the severity of job losses could be ameliorated by policy interventions and programmes targeted at small enterprises and informal economic activity, housing and related services and supportive of low-wage employment.

We caution, however, that in the absence of evidence on the distribution of earnings within industries, we are obliged to regard the apparent gap between earnings and employment trends as unconfirmed. The national accounts are due to be revised later this year, and it is possible that there will be substantial adjustments to industry earnings estimates. The QLFS surveys in 2020 were affected by covid-related limitations and perhaps comprise a sample that is too small to provide reliable industry-specific trends.In our view, further work is needed to reconcile the available macroeconomic and labour market data if industry trends and their distributional consequences are to be adequately understood.

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Appendix: Steady-state trend in employment

A stochastic filter of a time series trend is a function that can represent the steady-state trend, after removing noise. A stochastic filter is more appropriate, for example, than a linear trendline, because of fluctuating directions of a trend over time. Figure 6 below, uses one such type of stochastic filter, the Hodrick-Prescott (HP) filter, to analyze the general trend in log employment for different industries. The growth trend g_t is found by minimizing the magnitude

$$\sum_{t=1}^{T}(y_t - g_t)^2 + \lambda \sum_{t=2}^{T-1}((g_{t+1} - g_t) - (g_t - g_{t-1}))^2$$

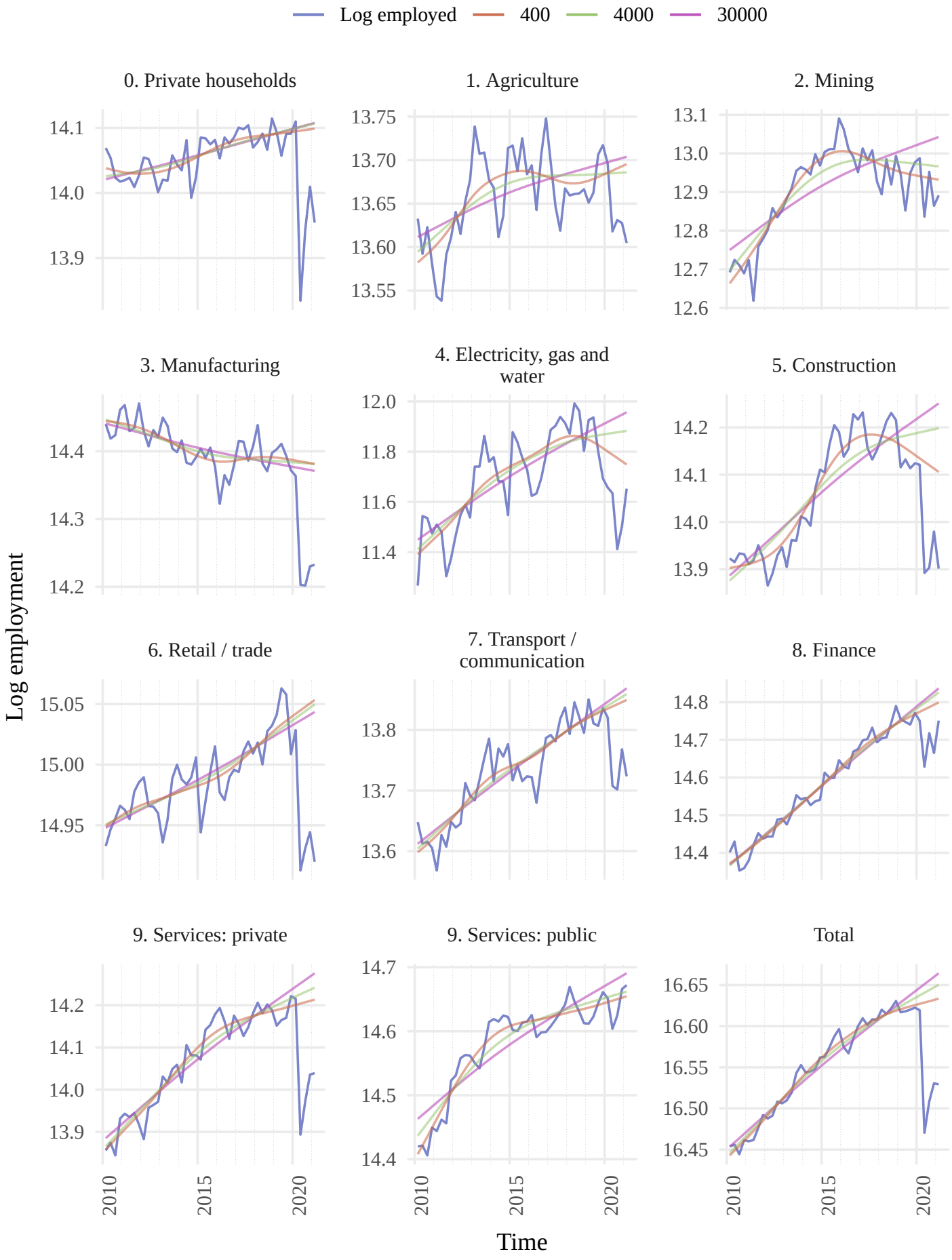
(Sørensen & Whitta-Jacobsen, 2010: 362)

where y_t is log employment, g_t is the steady-state trend and λ is a parameter chosen by the observer. The first term represents deviations from actual noise or business cycles. Since y_t here is measured in logarithms, $g_{t+1} - g_t$ and $g_t - g_{t-1}$ are approximately percentage growth rates in employment. Thus, choosing a higher value of λ will result in more weight being placed on the smoothing part of the optimization algorithm.

So, there is discretion involved with choosing how smooth the steady-state trend should be. In Figure 6, three different Hodrick-Prescott filters are shown, with different values of the lambda parameter (with higher values giving smoother trends). Note that we calculate the function up to 2020 Q1, then project the last gradient of the function linearly across the following three quarters of 2020. We do this because we intend on observing the structural break—the drop in employment from trend.

This stochastic filter easily shows the overall trends for the different industries, over time. For example, in the construction sector, employment grew between 2010 and 2017, but then started declining between 2017 and 2020. A stochastic filter is not good enough for a counterfactual however, as it is too smooth; noise and business cycles exist.

Figure 6: Steady-state employment trends: Hodrick-Prescott functions with different values for λ



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