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How have formal firms recovered from the pandemic?

Insights from survey and tax administrative data in Zambia

Christopher Hoy,[1] Laban Simbeye,[2] Muhammad Abdullah Ali Malik,[1] Aliisa Koivisto,[3] and Mashekwa Maboshe[4]

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Abstract: This paper examines how formal firms have been impacted by and recovered from the pandemic by drawing on two distinct but complementary data sources. This is the first attempt to use both survey and tax administrative data to measure the initial decline and subsequent recovery of firm sales and employment in a low- or lower-middle-income country. Specifically, the findings of three rounds of follow-up surveys to a standard World Bank Enterprise Survey completed immediately prior to the pandemic are compared to information contained in the universe of value added tax and personal income tax returns filed by firms during 2020 and the first half of 2021 in Zambia. Despite substantial differences in terms of the breadth and depth of these data sources, they show a very similar pattern. Sales by formal firms recovered from the pandemic far more strongly than their employment levels. By July 2021, both the survey and tax administrative data show that most firms experienced a complete recovery in sales, while levels of employment worsened over the course of the pandemic for many firms. Two key insights emerge from this analysis. First, formal firms appear to have adjusted their operations in a way that reduced their need for as much labour to achieve the same (or higher) levels of sales. Second, if formal firms' reduced reliance on labour persists, lower levels of formal employment in low- and middle-income countries may be a concerning consequence of the COVID-19 pandemic that lingers for years to come.

Key words: firms, COVID-19, tax administrative data, Zambia, economic recovery

JEL classification: D22, J21, J23, O12

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[1] World Bank, Washington, DC, USA; [2] Zambia Revenue Authority, Lusaka, Zambia; [3] UNU-WIDER, Helsinki, Finland; [4] Zambia Institute for Policy Analysis and Research, Lusaka, Zambia; corresponding author: choy@worldbank.org

1   Introduction

Policies introduced to control the spread of COVID-19 have caused unprecedented economic upheaval throughout the world, particularly for firms in low- and lower-middle-income countries that typically received little to no government support. Mobility and economic activity restrictions, alongside higher transaction costs and disruptions in cross-border trade, have hindered the allocation of resources within countries and across industries, lowering aggregate productivity growth (Apedo-Amah et al. 2020). Additionally, the pandemic has substantially shifted consumer demand, which has forced fundamental changes to business practices that are likely to persist in the medium term (Barrero et al. 2020). Therefore, it is imperative to develop a greater understanding of how firms have coped in this extremely challenging environment, especially in lower-income settings.

We examine this issue by drawing on a combination of survey and tax administrative data to analyse how formal firms in Zambia have recovered from COVID-19.[1] In general, the composition of the formal sector in Zambia is similar to many other medium-sized sub-Saharan African countries, except there is a greater prevalence of firms in the mining sector (World Bank 2022). As is the case in most countries around the world, at the outset of the pandemic the government of Zambia introduced restrictions to control COVID-19, which considerably curtailed normal economic activity. We investigate how firms have fared since this initial shock by using three follow-up surveys to a standard World Bank Enterprise Survey (ES) covering a representative sample of 601 formal firms that was conducted immediately prior to the pandemic and by drawing on the universe of monthly value added tax (VAT) and pay as you earn (PAYE) returns filed by around 20,000 firms throughout 2020 and the first half of 2021.[2]

Both data sources have strengths and weaknesses. A key advantage of the survey data is that firms provide extensive details about their operations when completing the questionnaire, but a limitation is that respondents only make up a relatively small share of all formal firms and some sectors are excluded (e.g. the mining sector). In contrast, tax administrative data captures all firms in all sectors that file VAT and PAYE returns. However, not all firms file returns each month, and they are only required to provide limited information about their activities when they do (e.g. total monthly sales and number of employees paid each month). By comparing the findings across these different data sources, it is possible to have far greater confidence in what actually took place regarding the recovery (or lack thereof) of formal firms.

We show, in both the survey and tax administrative data, that the sales of formal firms in Zambia recovered from the pandemic far more strongly than their employment levels. The order of magnitude of the initial decline and subsequent recovery of firms varied between the survey and tax administrative data, with the latter presenting a more positive picture. However, the overall trend was the same. In June 2020, on average, formal firms reported a large decline in sales and a moderate fall in employment. In contrast, by July 2021, most firms had experienced a complete recovery in their sales, while the share of firms reporting that they had decreased their number of employees doubled. Econometric analysis examining the factors associated with an initial decline and subsequent recovery illustrates structural factors (e.g., the type of business activity a firm was involved in) were more closely correlated with changes in sales than changes in employment, whereas the latter was more closely correlated with firm-specific factors (e.g. the level of experience of the top manager).

These results provide several insights about how formal firms have recovered from the COVID-19 crisis. First, there has been a 'decoupling' between the levels of sales and employment among some formal

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[1] For the purposes of this study, formal firms are defined as firms that are registered with the Zambia Revenue Authority.

[2] In Zambia, personal income tax is recorded in PAYE returns.

firms in Zambia. Formal firms appear to have adjusted their operations in a way that reduced their need for labour to achieve the same (or higher) level of sales. As such, one way firms were able to be resilient and rebound from the crisis was to reduce their labour inputs, which can often be challenging to lower in more stable settings. Second, if formal firms' reduced reliance on labour persists, lower levels of formal employment in low- and middle-income countries may be a concerning consequence of the COVID-19 pandemic that lingers for years to come. Consequently, there may be a need for government support to expand opportunities for workers to join formal firms. Third, firm-specific factors, more than structural factors, appear to be associated with whether firms experienced a recovery in employment. This implies that there may be further scope for some firms to fully return their number of employees to pre-pandemic levels by taking actions within their control.

This paper makes two contributions to the existing literature on the impact of COVID-19 on formal firms. First, we draw on two distinct but complementary data sources to track how firms were impacted by and have recovered from the pandemic. Previous studies have either relied on surveys of firms (e.g., Davies et al. 2021; Apedo-Amah et al. 2020; Cirera et al. 2021; Karalashvili and Viganola 2021) or tax administrative data (Angelov and Waldenström 2021; Bachas et al. 2020, 2021; Mascagni and Lees 2022). To the best of our knowledge this is the first effort to combine these data sources, which allows us to present a far richer picture of how COVID-19 has impacted firms. Extensive efforts are made to identify whether differences (and/or similarities) in the findings across survey and tax administrative data can partly be explained by differences between the samples of firms.

Second, this is among one of the first in-depth studies to specifically focus on the recovery of formal firms from the pandemic in a sub-Saharan African country. The recovery in the region is likely to be distinct from what has occurred elsewhere in the world for several reasons (Aga and Maemir 2021). First, in general firms in sub-Saharan Africa received very low levels of government support and it has been argued that this led firms to be more likely to lower wages, layoff workers, and face bankruptcy (Davies et al. 2021). Second, at the outset of the pandemic the operations of firms in the region relied heavily on face-to-face interactions, which were greatly disrupted by COVID-19 lockdowns (Bachas et al. 2021; Davies et al. 2021). Lastly, small firms make up the bulk of economic activity in sub-Saharan African countries, and due to having more limited financial, technological, and human resources, alongside higher dependence on supply chains, were more likely to fare worse than larger firms (Bachas et al. 2021; Davies et al. 2021; Muzi et al 2021).

This paper is structured as follows. Section 2 provides background about the related literature, the private sector prior to the pandemic in Zambia, and the government policies implemented to address COVID-19 in Zambia. Section 3 outlines the data sources that we draw on and the analysis that we conducted to produce the paper's findings. Section 4 presents the findings and Section 5 discusses the implications, as well as areas for future research.

2   Background

2.1   Related literature

This paper is related to the growing literature on the impact of COVID-19 on the private sector. Dai et al. (2021), Bartik et al. (2020), Humphries et al. (2020), Apedo-Amah et al. (2020), Adams-Prassl et al. (2020), and Fairlie (2020a, 2020b) have all documented COVID's impact on businesses across countries in terms of revenue loss, business closures, mass layoffs, and liquidity. In most cases, such as Karalashvili and Viganola (2021), Cirera et al. (2021), Apedo-Amah et al. (2020), and Davies et al. (2021), research has been conducted using surveys, primarily World Bank Business Pulse Surveys (BPS), as well as the COVID-19 follow-up rounds of World Bank ES. This research paints a sobering

picture of the impact of COVID-19. Firms have reported a significant drop in sales and reduced access to finance, and they envision additional losses in the future due to exceptionally high uncertainties going forward. This has prompted firms to make many difficult decisions involving significant reductions to their labour force. For example, following sales declines and firm closures in North Macedonia, firms interviewed in COVID-19 follow-up surveys to the ES exhibited a net reduction in employment of 7 per cent since October 2020, highlighting the persistent struggle of businesses as they continue to navigate the COVID-19 era.

Another strand of literature has used tax administrative data to estimate the impact of COVID-19 on the private sector. For example, Bachas et al. (2020, 2021), Mascagni and Lees (2022), and Angelov and Waldenström (2021) highlight the role tax administrative data can play in measuring economic activity in the private sector. Data is collected continuously, often at high frequencies, and typically covers a high share of formal firms. Similar to the aforementioned research based on surveys, analysis of tax administrative data has highlighted the pandemic's negative impacts on firms' sales and employment levels. Many firms have struggled to stay profitable, and at times have exited the market completely. For example, Mascagni and Lees (2022) use VAT returns to outline the severe repercussions of COVID-19 lockdowns in Rwanda. Despite reporting low numbers of COVID cases, VAT-registered firms in Rwanda experienced a 30 per cent drop in aggregate sales over the lockdown period. Over this period, losses in sales amounted to 5.2 per cent of GDP, with smaller firms suffering the most in proportionate terms. Mascagni and Lees (2022) also show that firms belonging to the accommodation, food, and transport sectors have struggled in particular since the onset of the pandemic.

There is also a relevant strand of the literature that goes beyond measuring the crippling impacts of COVID-19 by examining what characteristics of firms are associated with their recovery from crises. Jin et al. (2018) studied the recovery of firms' performance in the aftermath of the 2007–08 global financial crisis. They found that firms with stronger financial constraints experienced a more sluggish recovery from the crisis relative to firms with weaker constraints. Additionally, well-developed financial institutions and structures were able to contribute significantly to firms' recovery by easing their financial constraints. Amin and Viganola (2021) corroborate these findings: firms with better access to finance experience a less significant drop in sales, albeit results are highly heterogeneous. The reduction in likelihood of a decline in sales is much higher for firms that have a stronger and longstanding relationship with prominent stakeholders such as skilled workers and input suppliers. Cowling et al. (2018) also analysed the 2008 global financial crisis and found that firms that had been established for longer periods of time were in a better position to stave off negative impacts from the crisis compared to young firms. Furthermore, the severity of the crisis meant that previous entrepreneur experiences did not have any substantive effects on small business performances. Jolevski et al. (2021) suggest that firms that survived the COVID-19 crisis were older and more productive; they also tend to be innovators, use digital technology, and operate in less burdensome business environments. For example, more than half of (reporting) surviving firms in Mongolia adjusted their production or services; 31 per cent of these businesses started online business activity, and 40 per cent started or increased contactless delivery.

2.2 Setting

Formal firms in Zambia before the pandemic

Zambia's annual real GDP grew at an average annual rate of 4.3 per cent from 2010 to 2019, before registering a real contraction of 2.8 per cent in 2020 (World Bank 2022). The largest economic sectors by percentage share of GDP in the pre-pandemic period (2010–19) were: wholesale and retail, mining, construction, manufacturing, and agriculture (which contributed approximately 21, 14.5, 10, 7, and 6.5 per cent of GDP respectively). The five largest sector contributors to GDP growth over the pre-pandemic period were wholesale and retail, information and communication technology (ICT), con-

struction, manufacturing, and finance, which contributed 25, 15, 10, 10, and 6 per cent to GDP growth respectively.

While real growth has been positive, it has been declining in most major sectors due to various factors (Figure 1). Agricultural firms experienced volatile output in the period before the pandemic. The negative growth observed in agriculture largely coincided with the drought and electricity shortages the country experienced around 2013, 2015, and then later in 2018. The mining sector largely experienced relatively steady real annual growth of around 2.2 per cent over the pre-pandemic period, although the sector suffered output loss arising from the debilitating 2015 electricity crisis and drop in the international copper prices in 2019. Figure 1 also highlights that the manufacturing and wholesale and retail sectors largely maintained positive real growth, although real growth declined around 2017–19, presumably due to declining consumer demand as inflation and budget deficits increased. The ambitious infrastructure development programme that the government embarked on around 2014–18 significantly contributed to construction sector growth. However, most construction projects had to be stopped due to the rising budget deficits and increased debt service obligations just before the onset of the pandemic.

Figure 1: Real GDP growth by sector in Zambia, 2011–20
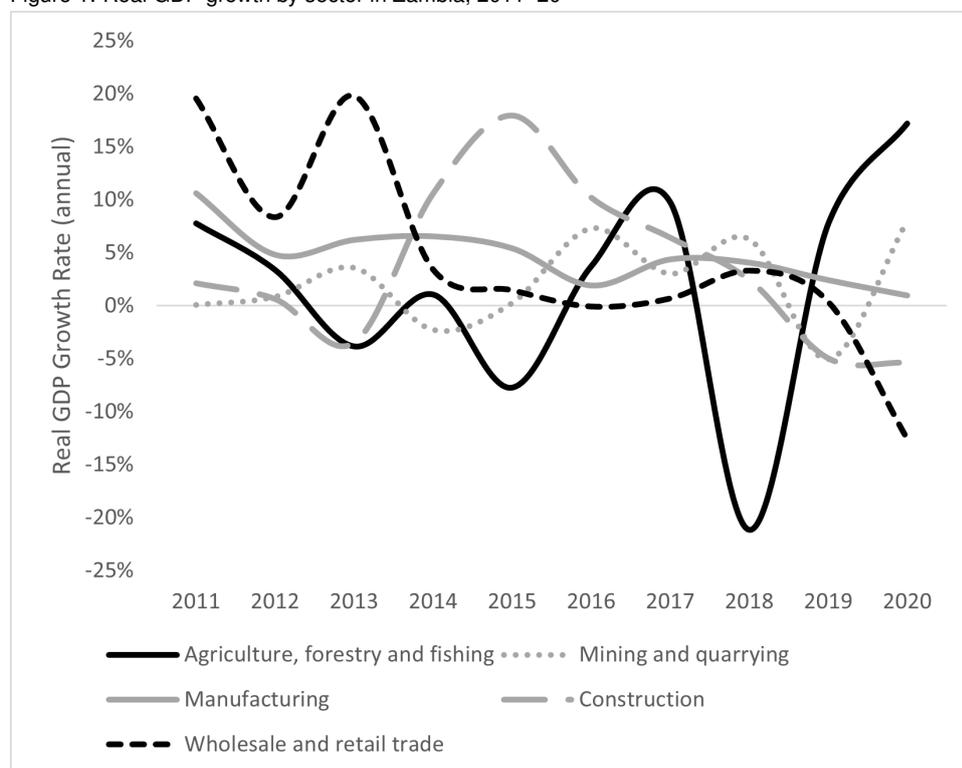
Source: authors' compilation based on World Bank (2022).

To get a sense of the firm performance just before the COVID-19 pandemic in Zambia we use employment and sales data from the World Bank ES conducted from September 2019 to March 2020. While the survey excluded some sectors, such as mining and agriculture, most of Zambia's largest economic sectors (wholesale and retail, manufacturing, and construction) were covered, as were rapidly growing sectors such as tourism and ICT. According to the World Bank (2020), Zambia's annual private sector employment grew by an average of 3 per cent, which was lower than the sub-Saharan African average employment growth rate of 7 per cent. Real sales in Zambia declined by an average of 2 per cent per annum, while the average sub-Saharan African growth rates was 3 per cent. The below-average employment growth may have been due to the negative impact of the 2015–18 electricity outages that affected economic output and thus employment demand in the manufacturing, hotel and restaurant, and construction sectors. The negative growth in real sales is likely due to both reductions in actual economic

output due to the electricity crisis and relatively high inflation faced in Zambia just before the COVID-19 pandemic. Other factors, such as poor access to adequate finance, poor access to reliable electricity, and competition from informal sector players, are also thought to have impacted Zambian formal firms' ability to increase sales and employment (World Bank 2020).

COVID-19 in Zambia and government responses

Since the confirmation of the first case on 8 March 2020, Zambia has seen a significant rise in COVID-19 cases, manifesting in four waves. The first wave surged around June/July 2020, and the second between December 2020 and May 2021; the third wave commenced in June 2021 and the fourth peaked in January 2022 (Figure 2). The number of daily COVID-19 cases was much higher in each of the subsequent waves. In total, as of 1 April 2022 there have been 316,850 confirmed cases of COVID-19, with 3,966 deaths, reported to WHO.

Figure 2: COVID cases and restrictions in Zambia
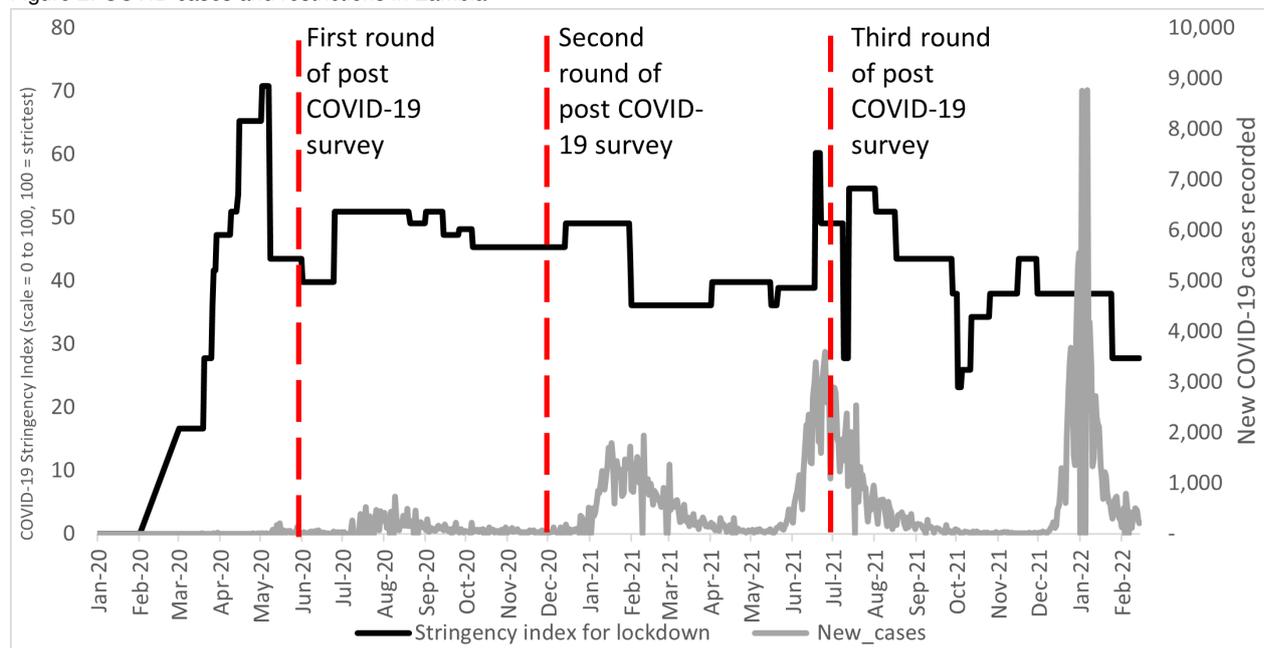
Source: authors' compilation based on University of Oxford (2022) and WHO (2022).

The government of Zambia introduced measures to contain the spread of COVID-19, including nation-wide lockdowns. Regulatory protocols on movement, congregation, and contact were put in place to address the health and medical aspects of the pandemic. Disease surveillance measures included (1) increased screenings at airports, border entry points, and hotspots; and (2) institution of 14-day monitoring for individuals at high risk of COVID-19. Measures to minimize contact included introduction of social distancing, the use of face masks, and increased hygiene measures, such as the use of sanitizers. Movement restrictions involved closing some airports, lockdowns at home, travel bans, and transport limitations. Congregation restrictions targeted: (1) closure of schools, universities, and religious institutions; (2) bans on public, social, and religious gatherings; (3) restrictions on permits for conferences, weddings, funerals, and festivals; (4) restrictions on restaurants, entertainment, bars, tourism, and informal markets; and (5) directing non-essential workers to work from home (where possible or on a rotational basis). The COVID-19 Stringency Index is a measure of the severity of lockdown and mobility restrictions introduced by the government. Based on this index, the severity of restrictions in place in Zambia peaked in May 2020 and have remained fairly stable from June 2020 to February 2022 (Figure 2).

As part of the government of Zambia's COVID-19 response plan, tax relief measures were introduced to ease the pressure on companies. They included: (1) a waiver on interest on outstanding tax liabilities associated with the pandemic; (2) suspension of excise duty on ethanol for use in alcohol-based sanitizers and other medical-related commodities; (3) removal of provisions relating to claims of VAT on imported spare parts, lubricants, and stationery; (4) suspension of export duties on exports of concentrates in the mining sector; and (5) suspension of export duty on precious minerals and crocodile skin. Businesses also benefited from other measures, such as ZAR2.5 billion (US$142 million) in financial relief for businesses, expanded credit options, and import and export waivers (BOZ 2020).

Additional financial sector support included: (1) upwards revision of transactions and balance limits for individuals, small-scale farmers, and enterprises, and also of limits by agents to give them more float to process transactions; (2) removal of transaction limits on agents and corporate wallets; and (3) reduction of processing fees for real-time gross settlements (RTGS). In addition, the central bank extended liquidity support to financial service providers in response to the Bank of Zambia's announcement of 'Measures in Response to the Deteriorating Macroeconomic Environment and the Coronavirus'. These measures included a targeted medium-term refinancing facility with an initial amount of ZAR10 billion (US$569 million) that aimed to relieve cash-strapped enterprises and enable financial institutions to meet local business capital needs (BOZ 2021).

3   Methodology

3.1   Data sources

World Bank ES data

As part of the efforts of the World Bank Group to understand the impact of COVID-19 on the private sector, the Enterprise Analysis Unit conducted follow-up surveys on recently completed ES in several countries. Wherever possible, these short surveys follow the baseline ES, re-contacting all establishments sampled in the standard ES using stratified random sampling. The universe of inference is all formal establishments with five or more employees that are engaged in one of the following activities defined using ISIC Rev. 3.1: manufacturing (group D); construction sector (group F); services sector (groups G and H); transport, storage, and communications sector (group I); and information technology (division 72 of group K).

In Zambia, three rounds of follow-up surveys to the firms that participated in a World Bank ES completed immediately prior to the pandemic provide the most comprehensive source of survey data measuring the impact of COVID-19 on formal firms. The baseline ES was conducted from September 2019 to March 2020 and included 601 firms. Three follow-up phone surveys focusing on a subset of questions (including about sales and employment) were conducted in June and July 2020 (June 2020 round), December 2020 to February 2021 (December 2020 round), and July to September 2021 (July 2021 round). The response rate was 96.1 per cent in the June 2020 round and 95.1 per cent in the other rounds. Questions about changes in firm sales used a 'pre-pandemic' level of the same month in 2019 (to address concerns about seasonality across the calendar year) and changes in employment (both permanent and temporary) were based on a 'pre-pandemic' level of February 2020.

The survey samples of formal firms were largely based in urban areas, had 20–100 workers, and were mainly involved in retail, manufacturing (other than food), and other services (excluding agriculture inputs and equipment). The distribution of firms by location is Kitwe (100, 16.6 per cent), Livingstone (105, 17.5 per cent), Lusaka (294, 48.9 per cent), and Ndola (102, 17.0 per cent). By firm size it is: small

(231, 38.4 per cent), medium (250, 41.6 per cent), and large (120, 20.0 per cent).[3] By primary activity it is: manufacturing (121, 33.9 per cent), retail (123, 20.5 per cent), and other services (194, 32.3 per cent).

Tax administrative data

There are three main types of tax in Zambia; corporate income tax (CIT), personal income tax (PIT), and VAT. CIT in Zambia is taxed in accordance with the principal activity of the business. The CIT rates range from 10 per cent for incomes earned from agriculture to 40 per cent for incomes in the banking and telecommunications sectors. All businesses with annual turnover exceeding ZAR800,000 (approximately US$45,000) are expected to register, file returns, and pay income tax. It is compulsory for some sectors, such as activities involving scientific and professional services, to register for CIT irrespective of the size of their annual sales/turnover.

There are few self-reported PIT taxpayers in Zambia, which means the responsibility to pay PIT largely falls on employers. In this form, PIT is a PAYE tax and is withheld at source. PAYE directly taxes personal emoluments including wages, salaries, overtime pay, leave pay, commissions, fees, bonuses, and any other payments from employment. However, there are some exempt emoluments, such as pension benefits and gratuities. The design of PAYE tax in Zambia is largely progressive, with a certain proportion of earnings below the defined tax threshold of ZAR4,500 (approximately US$250) taxed at a rate of zero. The top rate for PAYE in 2022 was 37.5 per cent, compared to a Southern African Development Community (SADC) average of 30.1 per cent and an OECD average of 56 per cent.

Zambia introduced VAT as a principal consumption tax on goods and services in 1995. VAT in Zambia is imposed on the final consumers of both imported and locally manufactured standard rated goods. Goods and services are classified into three broad categories for VAT purposes. These include zero-rated supplies, where input VAT incurred is claimable while output VAT is charged at 0 per cent. The other class of supplies is exempt supplies, where input VAT incurred is non-claimable and output VAT is not chargeable. The remainder of inputs are taxed at a standard rate of 16 per cent of sale value. This standard tax rate is similar to the SADC average.

Filing of tax returns is the principal means by which a taxpayer's tax liability is determined by the Zambian Revenue Authority. VAT and PAYE returns contain information about formal firms' revenue and employment levels each month. Further background information about firms is also available, such as their locations, sectors, and registration dates, which can be used to estimate the age of the firm (see examples of VAT and PAYE returns in Appendix A).

Firms that filed VAT and PAYE returns in 2020 were largely based in urban areas and were mainly involved in wholesale/retail trade and manufacturing. Almost two-thirds of firms were in Lusaka (the capital and by far the largest city). Almost half of firms were involved in wholesale and retail trade, and another 14 per cent were involved in manufacturing (these were by far the two most common types of business activities). This is a somewhat similar composition of firms to the survey sample. A noteworthy difference is that the bulk of firms that file VAT and PAYE returns have fewer than five employees (and these firms were disproportionately involved in retail trade).

Differences between the two data sources

Table 1 summarizes the key differences between the tax administrative and survey data. It is important to keep these differences in mind when considering what analysis will be completed and comparing the findings across the data sources.

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[3] Small, medium, and large firms comprise 5–19, 20–99, and 100+ workers, respectively

Table 1: Key differences between the survey and tax administrative data

	Tax administrative data	Survey data
Coverage	All firms	Subset of firms
Number	Around 20,000 firms	601 firms
Location	All locations	Only 4 largest cities
Size	All sizes above thresholds	Only firms with 5 or more employees
Sector	All sectors	Manufacturing, retail and wholesale trade, other services
Information	Sales, employment, location, sector, and age	Many firm characteristics

Source: authors' compilation.

3.2   Analysis

There are two main parts to the analysis. The first focuses on measuring descriptive trends in sales and employment in the tax administrative and survey data over time, and the second examines what characteristics are associated with changes in firm sales and employment throughout the pandemic.

Descriptive trends in the tax administrative and survey data

The first and most straightforward part of the descriptive analysis is to calculate the overall trends in terms of sales and employment from pre-pandemic levels until mid-2021 according to the tax administrative and survey data. The general patterns across the different data sources are compared to see whether they suggest a similar trajectory in terms of the impact of COVID-19 on formal firms in Zambia. The tax administrative data is adjusted for inflation, drawing on monthly inflation rates released by the central bank of Zambia, so that comparisons over time can be made in real terms. The survey data is weighted to ensure it is representative of formal firms in Zambia that share the key characteristics that the original ES sampling frame is based on (e.g., having more than five employees, operating in specific sectors, located in urban areas). The survey weights also factor in the small amount of attrition between the baseline and follow-up surveys; however, this has negligible impact because there was a very high response rate across all three rounds. In addition, both data sources are winsorized at 2.5 and 97.5 per cent to ensure that the average trends are not entirely driven by outliers.

The next part of the descriptive analysis is to solely use the tax administrative data for the subset of firms that share similar characteristics to the firms that participate in the survey. The first step is to only focus on firms that file each month (i.e. they are 'perfectly compliant'). This is necessary as the overall trends in the tax administrative data are partly influenced by which firms choose to file in a given month and there is seasonality in when firms choose to file. A drawback from restricting the focus to these firms is that they are likely to be quite distinct from other formal firms. For example, they may be quite profitable and/or large so each month they always exceed the threshold for filing a tax return, whereas other firms may have sales that fluctuate around the threshold for filing. Another difference between the 'perfectly compliant' firms and other formal firms is that they may have a lower risk tolerance and/or greater exposure to the tax authority, which means they are less willing to avoid paying taxes. These characteristics could also be associated with other aspects of business operations (e.g. investment in R&D).

The second step in aligning the two data sources involves solely focusing on firms for which there are five or more employees and disaggregating the analysis by firm size. Specifically, we look at the trends over time across both data sources for 'perfectly compliant' firms with 5–19 employees (small), 20–99 employees (medium), and 100+ employees (large). These types of firms are also quite distinct from those with fewer than five employees (micro); in particular, it is expected they do not experience the same extent of fluctuations in sales and employment levels. A shortcoming of this approach is that the VAT returns do not include information about the number of employees of each firm. As such we merge

the VAT and PAYE return data and can only report on the subset of firms that provided both types of returns in a given month. Once again this is likely to mean the results may not be generalizable beyond firms that share these characteristics.

The final part of the descriptive analysis we conduct is to examine the trends from both data sources based on characteristics other than firm size. The three most notable characteristics are in terms of sector, location, and firm age, as this information is available for all firms in both data sources. The sector analysis is decomposed into three categories that are identical across the survey and tax data (manufacturing, retail and wholesale services, and other). The location analysis in both data sources focuses on a simple binary split between firms in Lusaka and firms everywhere else.

Determining the covariates of recovery

Both data sources, but particularly the survey data, provide the opportunity to explore what firm characteristics are associated with experiencing an initial reduction in sales and employment, as well as a recovery by 2021. This analysis complements exploring the descriptive trends because through conducting econometric analysis we can identify what firm characteristics appear to be most closely correlated with firm performance. It is important to emphasize that this regression analysis is not causal as there is no exogenous variation. We cannot rule out, among other things, reverse causality and omitted variable bias. For example, on the former, if we find a positive relationship between receiving government support and recovering from the pandemic, we cannot be sure whether this is because firms that received support were better placed to recover anyway or whether government support actually aided their recovery. An example of the latter is that both data sources (particularly the tax administrative data) only have a limited number of variables and there are likely to be other factors, such as the determination of the firm manager/owner, that may be impacting firm performance. These caveats need to be kept in mind when examining the findings of the econometric analysis.

For both data sources we conduct an ordinary least squares (OLS) regression in the form of a linear probability model.[4] Specifically, we have four main outcomes (Y) that are in the form of a dummy variable. These are: (1) whether a firm experienced a decline in sales compared to pre-pandemic levels in June 2020; (2) whether a firm experienced a decline in employment compared to pre-pandemic levels in June 2020; (3) whether a firm experienced a complete recovery in sales compared to pre-pandemic levels in July 2021; and (4) whether a firm experienced a complete recovery in employment compared to pre-pandemic levels in July 2021. The econometric model can be expressed formally as follows:

$$Y = \beta_0 + \beta_1 Size + \beta_2 Age + \beta_3 Activity + \beta_4 Lusaka + \varepsilon \tag{1}$$

whereby β_1 captures the extent to which the size of a firm (small, medium, or large) is associated with an outcome; β_2 captures the extent to which the age of a firm (in years) is associated with an outcome; β_3 captures the extent to which the activity of a firm (manufacturing, retail and wholesale services, or other) is associated with an outcome; β_4 captures the extent to which the location of a firm (Lusaka or elsewhere) is associated with an outcome; β_0 is the intercept; and is the model error term.

For the survey data we conduct further analysis to fully utilize the richer information available on respondents. First, we rerun the regression above and include additional baseline variables captured in the baseline ES (top manager's years of experience, >5 competitors entering the market in the last two years, new products introduced over the last three years, access to finance is a very severe/major obstacle, training is offered to permanent employees). Second, we rerun the regression above with the variables captured in the baseline ES and include further variables captured in the follow-up survey rounds reflecting how firm circumstances changed during the pandemic (changed business practices,

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[4] As a robustness check we rerun the regressions as a logit model and the results are qualitatively similar.

received any cash support from government). A noteworthy limitation of this analysis is that there is a non-trivial number of missing values for several of these survey questions. As such, as a robustness check we present in Appendix B the analysis excluding all respondents with missing values.

4   Findings

4.1   Sales

Survey findings

According to the survey data, on average, formal firms in Zambia experienced a very large decline in sales in 2020 and a substantial recovery in the first half of 2021. Figure 3 shows the average decline in sales (compared to the same month in 2019) was 42.7 per cent in June 2020, 33.9 per cent in December 2020, and 16.4 per cent in July 2021. The results disaggregated by firm size are striking. By July 2021, the average sales of large firms had fully recovered to 2019 levels; in contrast, small and medium-sized firms reported a larger initial decline and a slower recovery.

Figure 3: Average change in sales since 2019 by firm size according to the survey data
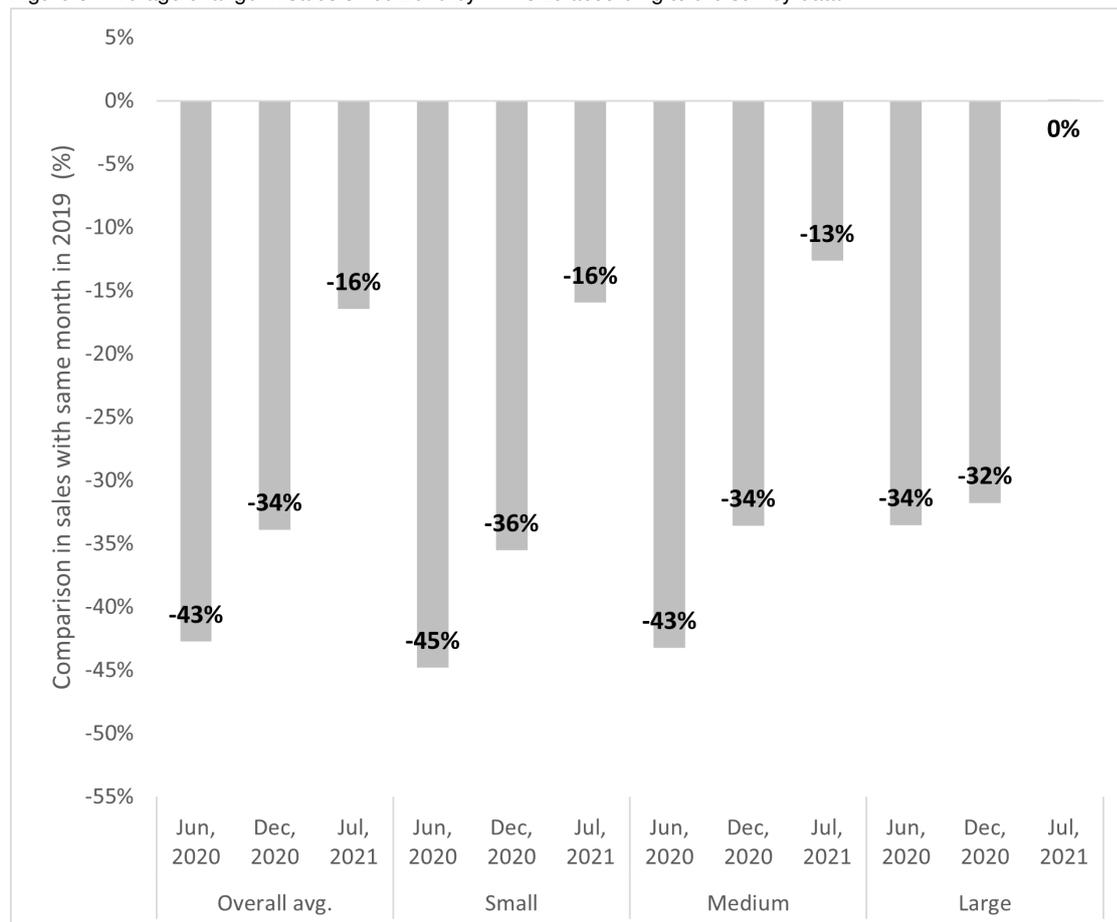
Source: authors' calculations using the survey data.

These average changes in sales somewhat mask variation between firms. Figure 4 shows that most firms reported a decline in sales (compared to the same month in 2019) in June and December 2020, but by July 2021 less than half of the firms reported a decline in sales. As was the case for the average change, large firms fared much better than small and medium-sized firms. In July 2021 only around one-third of

large firms reported a decline in sales (compared to the same month in 2019), and almost half reported an increase in sales.

Figure 4: Share of firms that experienced a change in sales since 2019 according to the survey data
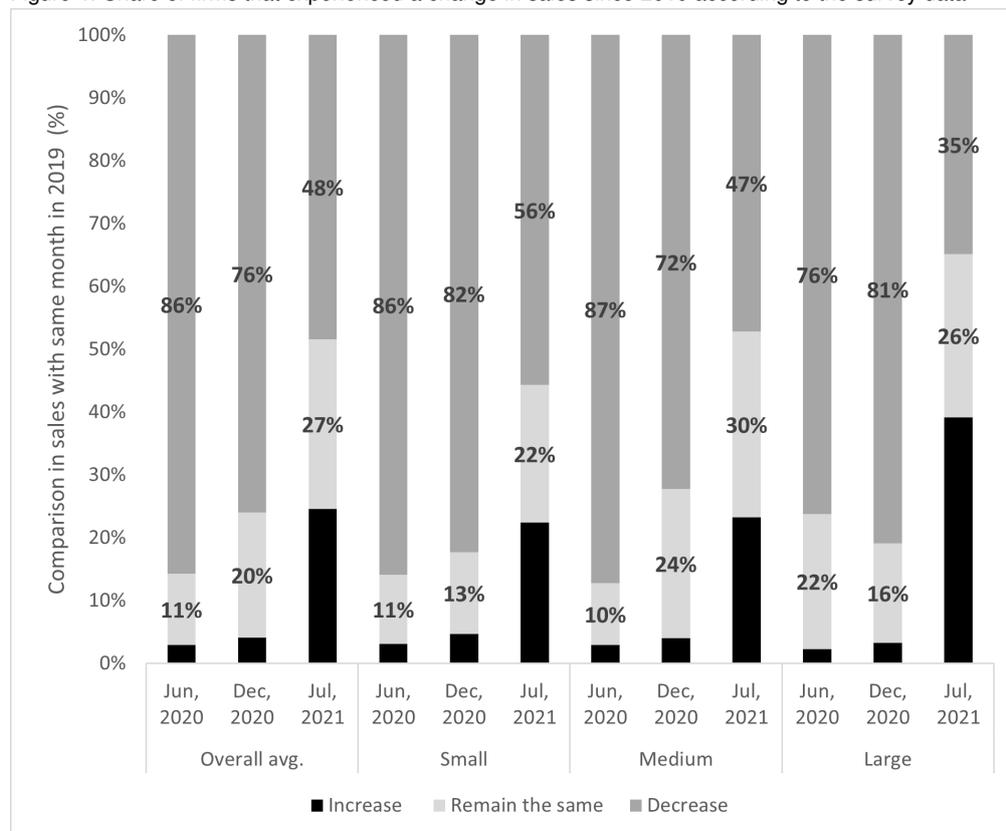
Source: authors' calculations using the survey data.

Tax administrative data findings

According to the tax administrative data, the sales of formal firms in Zambia followed a consistent seasonal pattern across the calendar year and were relatively stable in real terms in the years prior to 2020. This was followed by unseasonably low levels of sales during the strictest lockdown period in April and May 2020, followed by a strong recovery to near record high levels by the end of 2020. Figure 5 shows the log of reported monthly sales since January 2016 according to all VAT returns that were filed by firms, with the sales amounts indexed to January 2020. Sales during the COVID-19 lockdowns were around 10 per cent lower than January 2020 levels, whereas in the same months in 2019 sales were around 10 per cent higher than January 2020 levels. The recovery by December 2020 is notable as sales were over 20 per cent higher than January 2020 levels, whereas in December 2019 sales were around 15 per cent higher than January 2020 levels.

As was the case for the survey data, examining the overall trend in sales based on VAT returns of all filing firms masks significant heterogeneity between firms. Figure 6 shows the trends in nominal sales disaggregated by firm size and solely focusing on perfectly compliant firms (examining changes in sales in real terms shows a similar pattern). At least two key patterns emerge. First, these results indicate an initial decline as almost half of firms reported a decline in sales in June 2020, but by July 2021 there were signs of recovery as almost two-thirds of firms reported an increase in sales. Second, consistent with the survey data, the sales of a higher share of large firms have recovered more strongly than was the case for small and medium-sized firms.

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Figure 5: Reported sales of all filing firms each month since 2016 according to the tax data
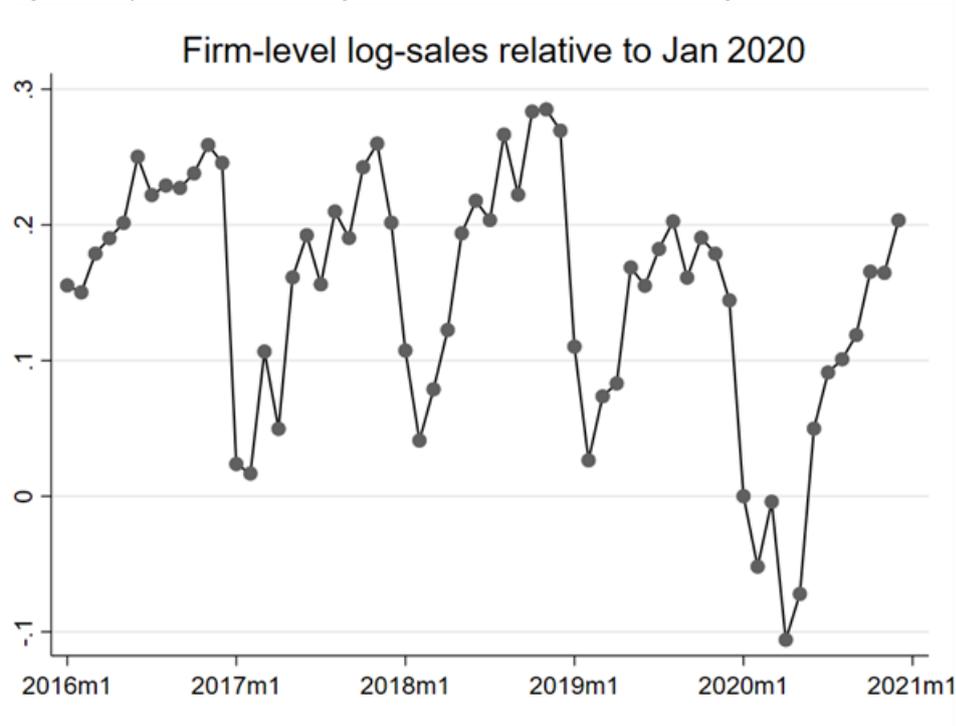
Source: authors' calculations using the tax data.

Figure 6: Change in sales of perfectly compliant firms by size compared to the same month in 2019
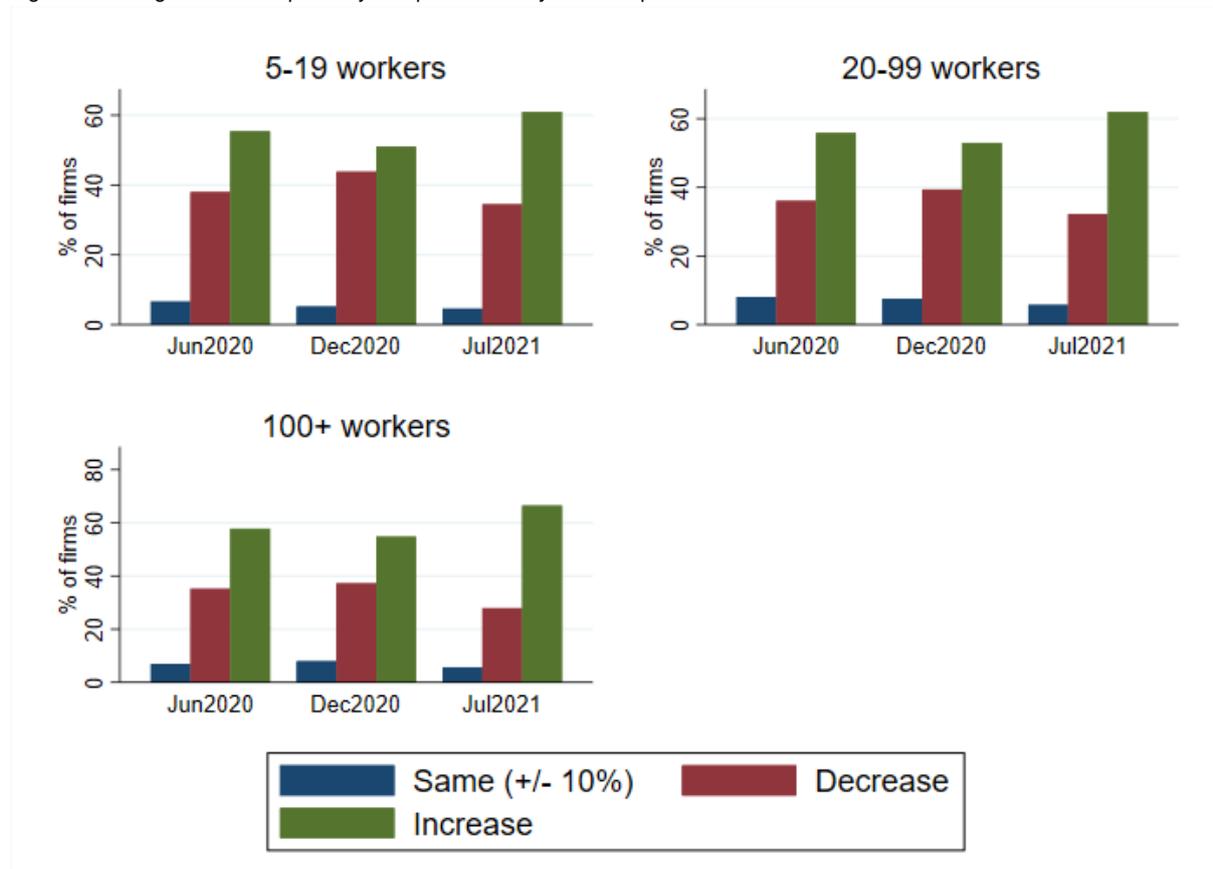
Source: authors' calculations using the tax data.

Summarizing the findings across the survey and tax administrative data

Both data sources illustrate that there has been a recovery in sales for most formal firms. Initially there was a large decline in sales during the period of the strictest lockdowns as almost half of firms in the tax administrative data, and close to 90 per cent in the survey data, reported lower levels of sales than in the same month in 2019. However, since this time there has been a dramatic improvement in the sales of firms. These trends are likely to be quite robust as there are consistent patterns across data sources that are rather distinct in terms of their breadth and depth.

4.2   Employment

Survey findings

The survey data suggests that there was an initial moderate decline in the number of permanent employees and no persistent signs of recovery since this time. Figure 7 shows the average decline in employment compared to February 2020 was 10.8 per cent in June 2020, 2.7 per cent in December 2020, and 24.7 per cent in July 2021. Any indication of recovery in employment by the end of 2020 clearly dissipated by mid-2021, when the reported fall in permanent employment was even larger than the initial fall. There was some variation by firm size whereby medium-sized firms were the most likely to report improvements in December 2020, but by July 2021 there were no differences by firm size.

Figure 7: Average change in permanent employment since February 2020 by firm size according to the survey data
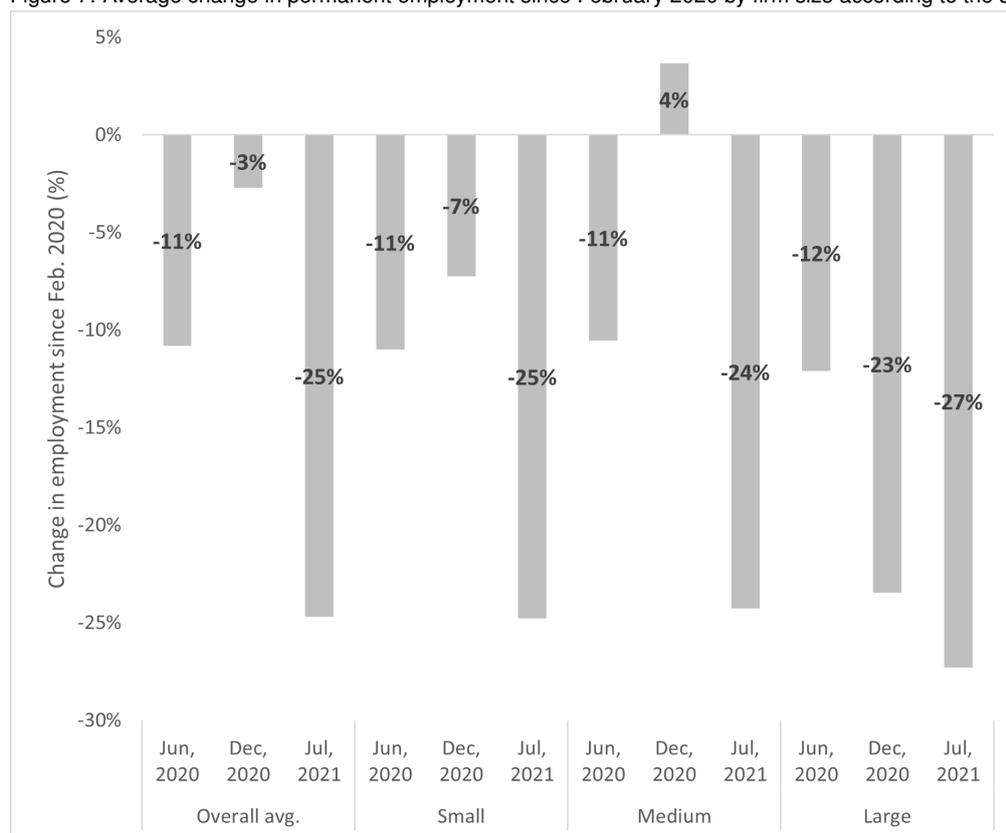
Source: authors' calculations using the survey data.

These average changes in employment in the survey data are largely consistent with analysis of the share of firms that experienced a change in employment since February 2020. Figure 8 shows that most firms reported a similar number of permanent employees in June 2020 as in February 2020; however, over time more firms reduced their number of employees. By July 2021, more than half of firms reported a decline in employment, with less than one in five increasing their number of employees. As was the

case for the average change, there was little variation between firms by their size (determined using the baseline ES from 2019).

Figure 8: Share of firms that experienced a change in employment since February 2020 according to the survey data
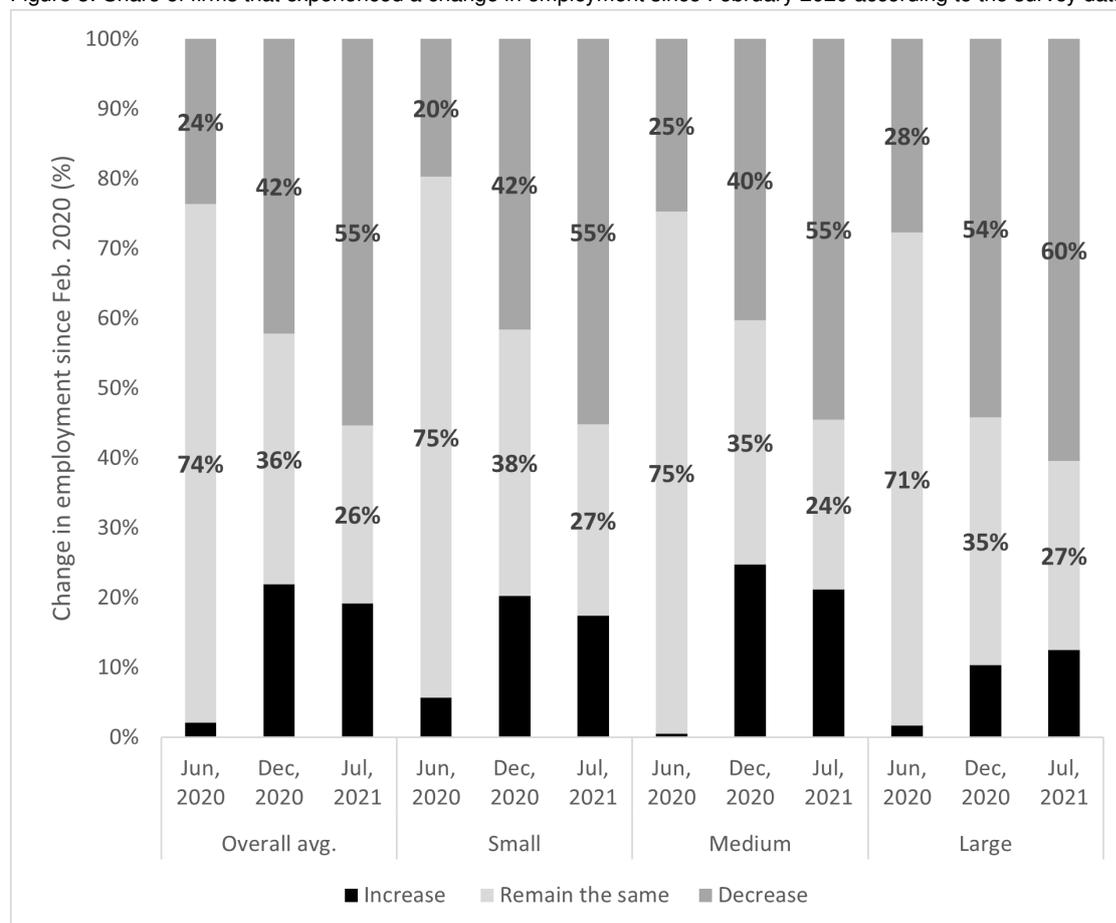
Source: authors' calculations using the survey data.

Tax administrative data findings

According to the tax administrative data, the average number of employees of all firms filing PAYE returns in Zambia declined abruptly at the start of the pandemic and slightly worsened over the next 12 months. Figure 9 shows that on average there were just over 24 employees at firms filing PAYE returns in January and February 2020, but this fell to around 22 employees in March 2020, which represents a decline in employment of almost 10 per cent. By February 2021, the average number of employees had fallen to 20, which suggests that around one in five jobs in formal firms no longer existed 12 months into the pandemic. There has been a slight recovery since this low point, but employment levels are still far from what they were pre-pandemic.

These average changes in employment in the tax administrative data are largely consistent with analysis of the share of firms that experienced a change in employment since February 2020. Figure 10 shows the trends in employment disaggregated by firm size and solely focusing on perfectly compliant firms. This indicates a worsening of the employment situation throughout 2020, with no signs of recovery in 2021. In June 2020, around two-thirds of firms reported no change in levels of employment since February 2020, but this fell to around one-third of firms by July 2021. Over this period the share of firms reporting a decline in employment almost doubled. There were few substantive differences between firms by size.

Figure 9: Reported employment levels of all filing firms each month from January 2020 to July 2021 according to the tax data
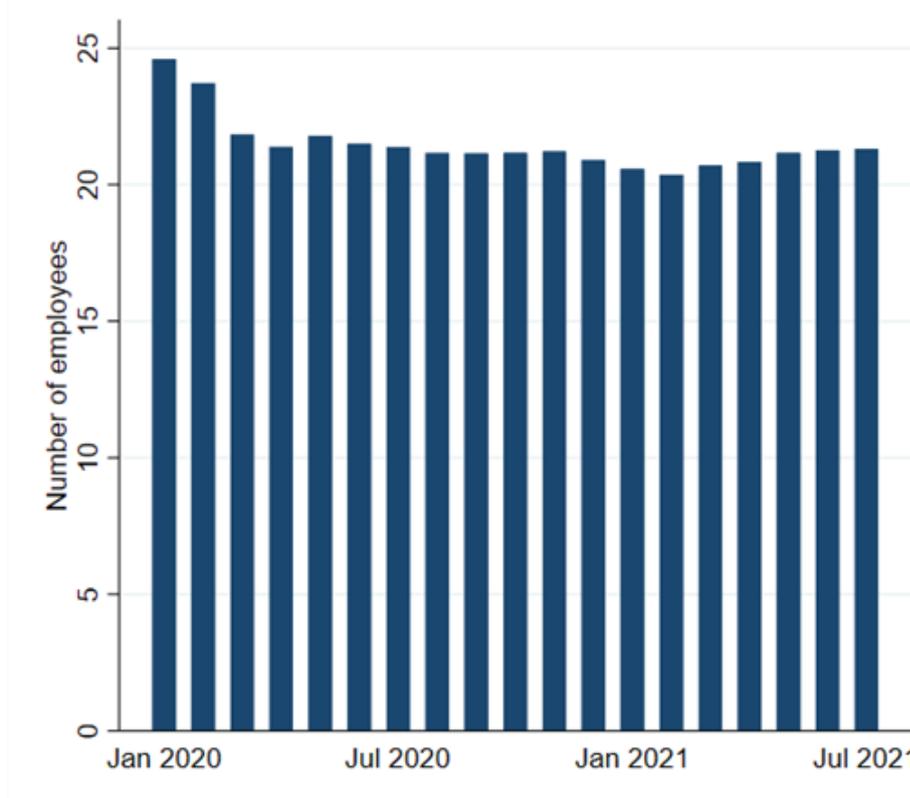
Source: authors' calculations using the tax data.

Figure 10: Change in employment of perfectly compliant firms by size compared to February 2020
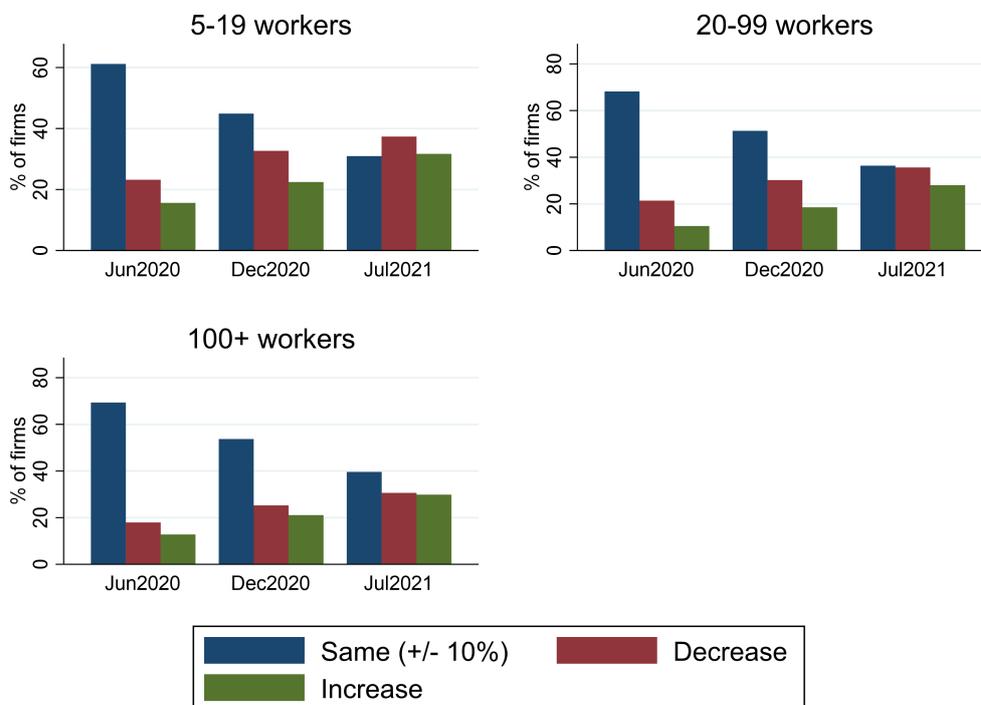
Source: authors' calculations using the tax data.

*Summarizing the findings across the survey and tax administrative data*

Both data sources paint a sobering picture about how the pandemic has impacted the employment levels of formal firms. There was an initial moderate decline in employment and there is evidence to suggest that over time the situation has only worsened. Regardless, there are clearly no meaningful signs of recovery, with a non-trivial share of people who were employed in formal firms in Zambia prior to the COVID-19 lockdowns no longer having a job even almost 18 months later. As discussed at length in Section 3, these data sources are quite different, but complementary. In the case of the survey data, employment refers solely to full-time employment, which may be less volatile than all types of employment captured in the tax administrative data. The fact that we see the same pattern in both the survey and tax administrative data illustrates how robust these findings are likely to be.

4.3 Covariates of recovery

We conduct econometric analysis to understand what factors are associated with firms experiencing an initial decline in sales and employment as well as a recovery. Table 2 reports on the factors associated with a decline in sales and employment levels in June 2020 from pre-pandemic levels, while Table 3 reports on the factors associated with a recovery in sales and employment to pre-pandemic levels by July 2021. As discussed at length in Section 3.2, we are not claiming that there is a causal relationship between the factors that we examine and firm sales and employment. Rather, the findings that follow show which factors are most closely correlated with firms experiencing a decline and/or recovery. In the discussion that follows we make an important distinction between structural (e.g. location of firms) and firm-specific (e.g. management experience) factors as it is likely that policy-makers can more easily influence the latter.

Factors associated with a decline in sales and employment levels in 2020

Table 2 shows that there were key structural factors associated with firms experiencing a decline in sales, but more firm-specific factors emerge regarding declines in employment. A decline in sales was closely correlated with business activities being outside of manufacturing and wholesale/retail trade. These firms were largely involved in services (other than retail), which were probably substantially impacted by social distancing restrictions introduced to reduce the spread of COVID-19. Larger firms were far less likely to report a decline in sales by June 2020, which may be because they have greater stability in operations. In addition, firms that reported changing their business practices in response to the pandemic were less likely to experience a decline in sales. In terms of employment, firms that faced large or very severe obstacles to access to finance immediately prior to the pandemic (according to the baseline ES) were more likely to reduce their number of employees. Firms that had reported introducing new products in the three years prior to the pandemic were far less likely to report reducing their number of employees.

Factors associated with recovery in sales and employment levels by 2021

Table 3 shows that a combination of structural and firm-specific factors were associated with firms experiencing a recovery in sales and/or employment by July 2021. Recovery in sales was more common among larger firms and those in manufacturing (these factors were also associated with less likelihood of a decline in sales initially). In addition, the top manager's level of experience was positively associated with a recovery in sales. A lack of recovery was more common among firms that were in a particularly competitive market (immediately prior to the pandemic they stated more than five competitors had entered their market in the previous two years). In regard to a recovery in employment, this was positively associated with top managers having more experience and receiving government support. A lack of recovery in employment was more common among older firms according to the survey data (the

opposite was the case according to the tax administrative data) and those outside of manufacturing and retail trade.

Table 2: Factors associated with a decline in sales and employment

	Sales (decrease) June 2020				Employment (decrease) June 2020			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables in tax administrative and survey data								
Activity[1]								
Retail	0.0449	−0.0151	−0.00125	−0.0136	−0.0149	−0.0155	−0.00484	−0.0327
	(0.0282)	(0.102)	(0.0990)	(0.0812)	(0.0269)	(0.0925)	(0.0887)	(0.0861)
Other	0.0421	0.121**	0.101*	0.0350	0.0101	0.0357	0.0154	−0.0270
	(0.0276)	(0.0559)	(0.0595)	(0.0540)	(0.0265)	(0.0823)	(0.0674)	(0.0758)
Size[2]								
Medium	−0.0008	0.0771	0.0576	0.0368	−0.0299	0.111	0.0947	0.0720
	(0.0207)	(0.0584)	(0.0599)	(0.0519)	(0.0197)	(0.0764)	(0.0673)	(0.0713)
Large	−0.0351	−0.0841	−0.128*	−0.0670	−0.0530**	0.0216	0.0541	0.0707
	(0.0273)	(0.0723)	(0.0755)	(0.0778)	(0.0258)	(0.0689)	(0.0769)	(0.0831)
Lusaka	−0.0022	−0.0185	−0.00128	−0.0114	−0.0108	0.00471	−0.0549	−0.0918
	(0.0191)	(0.0489)	(0.0498)	(0.0483)	(0.0184)	(0.0719)	(0.0570)	(0.0615)
Firm age	0.0000008	0.000863	0.00102	0.00002	−0.000008***	0.00385	0.00514	0.00429
	(0.000002)	(0.00211)	(0.00284)	(0.00268)	(0.000002)	(0.00335)	(0.00315)	(0.00320)
Other baseline survey characteristics								
Manager experience			−0.00132	−0.00175			−0.00241	−0.00283
			(0.00302)	(0.00271)			(0.00325)	(0.00331)
Competitive market			−0.0393	0.00144			0.0842	0.114
			(0.0508)	(0.0474)			(0.0738)	(0.0747)
Introduced new products			0.0597	0.0362			−0.172***	−0.208***
			(0.0500)	(0.0504)			(0.0544)	(0.0566)
Limited finance			−0.0522	0.0157			0.0942	0.141*
			(0.0574)	(0.0496)			(0.0769)	(0.0791)
Trained employees			0.103*	0.0828			0.0523	0.0408
			(0.0545)	(0.0504)			(0.0820)	(0.0833)
Information from follow-up surveys								
Changed practices				−0.0975*				0.00701
				(0.0499)				(0.0772)
Receive gov. support				−0.270				0.318
				(0.249)				(0.256)
Observations	2,918	578	578	514	2918	578	578	514

Note: this table is based on Equation (1). Columns (1) and (5) present the results for the tax administrative data. Columns (2)–(4) and (6)–(8) present the results for the survey data. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. [1] The omitted category is *manufacturing*. [2] The omitted category is *small*. *Manager experience:* defined as the number of years of experience of the top manager in the firm. *Competitive market:* dummy variable for whether a firm has had more than five competitors entering their market in the previous two years. *Introduced new products:* dummy variable for whether a firm introduced new products in the previous three years. *Limited finance:* dummy variable for whether a firm stated that access to finance was a very severe or major obstacle for their business. *Trained employees:* dummy variable for whether a firm stated that they offered their permanent employees training. *Changed practices:* dummy variable for whether a firm changed their business operations in response to the COVID-19 pandemic. *Receive gov. support:* dummy variable for whether a firm received some kind of cash support from the government to help deal with the impact of the pandemic.

Table 3: Factors associated with a recovery in sales and employment

	Sales (increase) July 2021				Employment (increase) July 2021			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables in tax administrative and survey data								
Activity[1]								
Retail	−0.0276	−0.171**	−0.174**	−0.227**	0.0045	0.00266	−0.0318	0.0113
	(0.0284)	(0.0727)	(0.0780)	(0.0885)	(0.0281)	(0.105)	(0.102)	(0.118)
Other	−0.0957***	−0.109*	−0.137**	−0.167**	−0.0659**	−0.185***	−0.179**	−0.207***
	(0.0277)	(0.0656)	(0.0621)	(0.0715)	(0.276)	(0.0708)	(0.0715)	(0.0746)
Size[2]								
Medium	0.0453**	0.00234	−0.0270	−0.0518	0.0224	−0.0130	−0.0133	0.0763
	(0.0206)	(0.0598)	(0.0551)	(0.0663)	(0.0207)	(0.0729)	(0.0722)	(0.0673)
Large	0.0710***	0.135*	0.0863	0.0879	0.0804***	−0.0228	−0.0264	−0.0157
	(0.0274)	(0.0706)	(0.0749)	(0.0872)	(0.0271)	(0.0733)	(0.0781)	(0.0633)
Lusaka	0.0234	0.0722	0.0867	0.0817	0.0194	−0.136*	−0.140*	−0.0763
	(0.0191)	(0.0556)	(0.0575)	(0.0709)	(0.0191)	(0.0737)	(0.0723)	(0.0805)
Firm age	0.000004	−0.000139	−0.00309	−0.00510	0.000007***	−0.00483*	−0.00828***	−0.00722**
	(0.000002)	(0.00251)	(0.00266)	(0.00338)	(0.000002)	(0.00267)	(0.00313)	(0.00308)
Other baseline survey characteristics								
Manager experience			0.00518*	0.00709*			0.00752**	0.00792**
			(0.00313)	(0.00416)			(0.00337)	(0.00346)
Competitive market			−0.117*	−0.145**			−0.0229	−0.0289
			(0.0603)	(0.0726)			(0.0659)	(0.0655)
Introduced new products			−0.0199	−0.0533			−0.0130	0.0615
			(0.0595)	(0.0679)			(0.0740)	(0.0779)
Limited finance			0.0241	0.0256			0.0415	0.0343
			(0.0597)	(0.0705)			(0.0723)	(0.0717)
Trained employees			0.0932	0.0828			−0.0602	0.0362
			(0.0614)	(0.0712)			(0.0763)	(0.0721)
Information from follow-up surveys								
Changed practices				−0.0110				−0.0624
				(0.0721)				(0.0747)
Receive gov. support				0.0440				0.562***
				(0.198)				(0.166)
Observations	2,918	578	578	434	2918	578	578	434

Note: this table is based on Equation (1). Columns (1) and (5) present the results for the tax administrative data. Columns (2)–(4) and (6)–(8) present the results for the survey data. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. [1] The omitted category is *manufacturing*. [2] The omitted category is *small*. *Manager experience:* defined as the number of years of experience of the top manager in the firm. *Competitive market:* dummy variable for whether a firm has had more than five competitors entering their market in the previous two years. *Introduced new products:* dummy variable for whether a firm introduced new products in the previous three years. *Limited finance:* dummy variable for whether a firm stated that access to finance was a very severe or major obstacle for their business. *Trained employees:* dummy variable for whether a firm stated that they offered their permanent employees training. *Changed practices:* dummy variable for whether a firm changed their business operations in response to the COVID-19 pandemic. *Receive gov. support:* dummy variable for whether a firm received some kind of cash support from the government to help deal with the impact of the pandemic.

5 Discussion and conclusion

5.1 Explanations for the findings of the study

This study has illustrated that, on average, the sales of formal firms in Zambia have recovered from the pandemic far more strongly than their employment levels. These findings suggest that formal firms have adjusted their operations in a way that reduces their need for labour to achieve the same level of sales. In other words, there has been a shift in the capital–labour mix that formal firms use, away from labour. If this is a persistent change, lower levels of formal employment in low- and lower-middle-income countries may be a concerning consequence of the COVID-19 pandemic that lingers for years to come. This pattern of a weak recovery of formal employment has also been observed in several emerging-market economies (Andaloussi et al. 2022). Ultimately, this means more people are in vulnerable employment situations that lack a formal safety net and there is less income tax being paid to fund the provision of public goods and services. Detailed investigation of the survey and tax administrative data does not suggest that the overall findings are due to improvements in formal sector labour productivity. There is no evidence of existing firms reporting higher average wages for the employees they retained or large shifts between relying on full-time compared to casual employees. In addition, the tax administrative data does not suggest there have been a large number of new firms entering the formal sector.[5] Rather, a more compelling explanation for what we observe is that many firms have tried to rebound from the crisis by reducing (in some instances potentially unproductive) labour inputs, which can often be challenging in a more stable setting. An unavoidable limitation of this study is that the focus is on only formal sector employment, which means that it is entirely possible that people who were previously in formal employment have moved to the informal sector and maintained (or even increased) their productivity.

5.2 Implications for policy-makers

The key implication for policy-makers from this study is that there is a clear need to foster greater recovery of employment among formal firms in Zambia. Non-trivial numbers of workers who were previously employed by formal firms no longer had formal jobs even over a year after the pandemic began. This means that across the economy as a whole, it is likely that formal employment has not rebounded to anywhere near pre-pandemic levels. There may be a need for government support to expand opportunities for workers to join formal firms. A potentially promising sign that emerges from the econometric analysis is that firm-specific factors, more than structural factors, appear to be associated with whether firms experienced a decline or recovery in employment. This may imply that there is greater scope for specific actions to be taken by firms to increase their number of employees. If structural factors were more closely correlated with changes in employment (e.g. the sector that firms operate in), there would potentially be far less scope for policy-makers to have an influence.

5.3 Contribution to knowledge

We draw on two distinct but complementary data sources that illustrate this same pattern. To the best of our knowledge this is the first attempt to use both survey and tax administrative data to track how firms have recovered from the pandemic. We have carefully examined the strengthens and weaknesses of both data sets to try to ensure as much comparability as possible. We hope that this effort will be replicated and improved upon elsewhere as triangulating findings across different data sources can provide both researchers and policy-makers with far more confidence in the robustness of the results. Particularly, the use of tax administrative data as a low-cost way to monitor economic activity is rather novel, and this

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[5] If this was the case, it could be possible that employees are leaving existing firms and moving to more productive new firms.

study shows how it can complement the largest existing effort to collect survey data from firms across countries, which is undertaken by the World Bank Enterprise Analysis Unit.

5.4   Areas for future research

At least three areas for future research emerge from this study. First, developing a better understanding of how formal firms have adjusted their capital–labour mix during this time of crisis is key as this will provide an indication as to whether the apparent 'decoupling' of sales and labour is transitory. Second, there is obvious value in generating causal evidence (our study does not do this, nor does it claim to) about what is driving the recovery of firms. Finally, more in-depth country studies in sub-Saharan Africa, drawing on multiple data sources, could help to build a comprehensive picture of the recovery of formal firms in the region.

References

Adams-Prassl, A., T. Boneva, M. Golin, and C. Rauh (2020). 'Inequality in the Impact of the Coronavirus Shock: Evidence from Real Time Surveys'. *Journal of Public Economics*, 189: 104245. https://doi.org/10.1016/j.jpubeco.2020.104245

Aga, G., and H. Maemir (2021). 'COVID-19 and African Firms: Impact and Coping Strategies'. Policy Research Working Paper 9642. Washington, DC: World Bank. https://doi.org/10.1596/1813-9450-9642

Amin, M., and D. Viganola (2021). 'Does Better Access to Finance Help Firms Deal with the COVID-19 Pandemic? Evidence from Firm-Level Survey Data'. Working Paper. Washington, DC: World Bank. https://doi.org/10.1596/1813-9450-9697

Andaloussi, M., L. Engbo Christiansen, A. Habib, and D. Malacrino (2022). 'Healing the Pandemic's Economic Scars Demands Prompt Action'. International Monetary Fund Blogs. Available at: https://blogs.imf.org/2022/05/17/healing-the-pandemics-economic-scars-demands-prompt-action (accessed 25 May 2022).

Angelov, N., and D. Waldenström (2021). 'The Impact of COVID-19 on Economic Activity: Evidence from Administrative Tax Registers'. SSRN Scholarly Paper. Rochester, NY: Social Science Research Network. https://doi.org/10.2139/ssrn.3885425

Apedo-Amah, M.C., B. Avdiu, X. Cirera, M. Cruz, E. Davies, A. Grover, L. Iacovone, et al. (2020). 'Unmasking the Impact of COVID-19 on Businesses: Firm Level Evidence from Across the World'. Working Paper. Washington, DC: World Bank. https://doi.org/10.1596/1813-9450-9434

Bachas, P., A. Brockmeyer, and C. Semelet (2020). 'The Impact of COVID-19 on Formal Firms: Micro Tax Data Simulations across Countries'. Working Paper. Washington, DC: World Bank. https://doi.org/10.1596/1813-9450-9437

Bachas, P., A. Brockmeyer, and C. Semelet (2021). 'The Impact of COVID-19 on Formal Firms in Honduras: Evidence from Monthly Tax Returns'. Brief. Washington, DC: World Bank.

Barrero, J.M., N. Bloom, and S. J. Davis (2020). 'COVID-19 Is also a Reallocation Shock'. Working Paper 27137. Cambridge, MA: National Bureau of Economic Research. https://doi.org/10.3386/w27137

Bartik, A.W., M. Bertrand, Z. Cullen, E.L. Glaeser, M. Luca, and C. Stanton (2020). 'The Impact of COVID-19 on Small Business Outcomes and Expectations'. *Proceedings of the National Academy of Sciences*, 117(30): 17656-66. https://doi.org/10.1073/pnas.2006991117

Bank of Zambia (BOZ) (2020). 'K10 billion Stimulus Package FAQs'. Lusaka: Bank of Zambia.

Bank of Zambia (BOZ) (2021). 'Targeted Medium-Term Refinancing Facility Report: January'. Report. Lusaka: Bank of Zambia.

Cirera, X., M. Cruz, E. Davies, A. Grover, L. Iacovone, J.E.L. Cordova, and D. Medvedev (2021). 'Policies to Support Businesses through the COVID-19 Shock: A Firm-Level Perspective'. Working Paper. Washington, DC: World Bank. https://doi.org/10.1596/1813-9450-9506

Cowling, M., W. Liu, and N. Zhang (2018). 'Did Firm Age, Experience, and Access to Finance Count? SME Performance after the Global Financial Crisis'. *Journal of Evolutionary Economics*, 28(1): 77-100. https://doi.org/10.1007/s00191-017-0502-z

Dai, R., J. Hu, and X. Zhang (2021). 'The Impact of Coronavirus on China's SMEs: Finding from the Enterprise Survey for Innovation and Entrepreneurship in China'. *ERENET Profile*, 15(1): 9–16.

Davies, E., G. Nayyar, S. Reyes, and J. Torres (2021). 'Firms through the Covid-19 Pandemic: Evidence from Sub-Saharan Africa'. In R. Arezki, S. Djankov, and U. Panizza (eds), *Shaping Africa's Post-Covid Recovery*. London: CEPR Press.

Fairlie, R.W. (2020a). 'The Impact of Covid-19 on Small Business Owners: Evidence of Early-Stage Losses from the April 2020 Current Population Survey'. Working Paper 27309. Cambridge, MA: National Bureau of Economic Research. https://doi.org/10.3386/w27309

Fairlie, R.W. (2020b). 'The Impact of COVID-19 on Small Business Owners: The First Three Months after Social-Distancing Restrictions'. Working Paper 27462. Cambridge, MA: National Bureau of Economic Research. https://doi.org/10.3386/w27462

Humphries, J.E., C. Neilson, and G. Ulyssea (2020). 'The Evolving Impacts of COVID-19 on Small Businesses Since the CARES Act'. SSRN Scholarly Paper. Rochester, NY: Social Science Research Network. https://doi.org/10.2139/ssrn.3584745

Jin, Y., M. Luo, and C. Wan (2018). 'Financial Constraints, Macro-Financing Environment and Post-Crisis Recovery of Firms'. *International Review of Economics and Finance*, 55(C): 54-67. https://doi.org/10.1016/j.iref.2018.01.007

Jolevski, F., S. Muzi, K. Ueda, and D. Viganola (2021). 'Surviving the Pandemic: A Business Perspective'. World Bank Blogs. Available at: https://blogs.worldbank.org/developmenttalk/surviving-pandemic-business-perspective (accessed 30 March 2022).

Karalashvili, N., and D. Viganola (2021). 'The Evolving Effect of COVID-19 on the Private Sector'. Brief. Washington, DC: World Bank.

Mascagni, G., and A. Lees (2022). 'The Economic Impact of the Pandemic in Rwanda: An Analysis of Firm-Level VAT Data'. *Journal of African Economies*. https://doi.org/10.1093/jae/ejac009

Muzi, S., F. Jolevski, K. Ueda, and D. Viganola (2021). 'Productivity and Firm Exit during the COVID-19 Crisis: Cross-Country Evidence'. Working Paper. Washington, DC: World Bank. https://doi.org/10.1596/1813-9450-9671

University of Oxford (2022). 'Oxford COVID-19 Government Response Tracker'. Available at: https://www.bsg.ox.ac.uk/research/research-projects/covid-19-government-response-tracker (accessed 3 March 2022).

World Bank (2020). 'Zambia Enterprise Survey 2019–2020'. Data set. Available at: https://microdata.worldbank.org/index.php/catalog/3763 (accessed 3 March 2022).

World Bank (2022). 'World Development Indicators'. Data set. Available at: https://datatopics.worldbank.org/world-development-indicators/ (accessed 3 March 2022).

World Health Organization (WHO) (2022). 'WHO Coronavirus (COVID-19) Dashboard' Available at: https://covid19.who.int (accessed 3 March 2022).

Appendix A: Examples of VAT and PAYE returns

ZAMBIA REVENUE AUTHORITY	
Domestic Taxes Division	
PAYE Return Form	
1) Taxpayer Identification Number (TPIN) *	
2) Type of Return *	
3) Amendment Approval Number	
4) Return From Date *	
5) Return To Date *	

NEXT

Part I : Employee Information	
1) Chargeable Emoluments (including salaries, wages, fees, commissions, bonuses, overtime, gratuity, etc.) (Sum of Column F of Part II)	0.00
2) Tax deducted (total tax deducted from the emoluments) Sum of Column H of Part II)	0.00
3) Tax adjusted (total tax adjusted from the emoluments) Sum of Column I of Part II)	0.00
4) Tax Payable/(Repayable)(2-3)	**0.00**
Other Information	
5) Number of employees at the beginning of the month	
6) Number of new employees employed in the month	
7) Number of employees that have separated in the month	
8) Number of employees at the end of the month	
Zambia Development Agency Approved Investments (only applicable to those with approved ZDA Incentives):	
9) License Number	
10) Total number of employees pledged to be employed in the year	
11) Number of employees employed prior to this month	
12) Number of new employees employed in the month	
13) Number of employees that have separated in the month	
14) Number of employees at the end of the month	

PREVIOUS   NEXT

ZAMBIA REVENUE AUTHORITY
Domestic Taxes Division
Value Added Tax Return

1) Taxpayer Identification Number (TPIN) *	
2) Type of Return *	Original
3) Amendment Approval Number	
4) Return From Date *	
5) Return To Date *	
6) Are You registered for Cash Accounting ? *	

NEXT

Section A : Sales

Particulars	(a) VAT Exclusive Value	(b) VAT
8) Standard rated local sales (Goods and Services) at normal taxable value	0.00	0.00
9) Local sales taxed at minimum taxable value (MTV)	0.00	0.00
10) Disposal of capital assets	0.00	0.00
11) Total standard Rated Outputs (8+9+10)	0.00	0.00
12) Export of standard rated goods and services		
13) Export of zero rated goods and services		
14) Other zero-rated outputs (e.g. supplies to donor funded projects or supplies to diplomatic missions etc.)		
15) Total zero-Rated Outputs (12a+13a+14a)	0.00	
16) Total taxable sales (11a+15a)	0.00	
17) Imported services (Reverse VAT)	0.00	0.00
18) Total tax due on outputs (11b+17b)		0.00
19) Local exempt sales		
20) Export of exempt goods and services		
21) Total exempt sales (19a+20a)	0.00	
22) Total sales (16a+21a)	0.00	
23) Payments received (*Applicable to taxpayers on cash accounting only)(# attributable to taxable supplies only)	0.00	0.00

PREVIOUS　　**NEXT**

Appendix B: Regression analysis excluding missing values

Table B1: Factors associated with a decline in sales and employment

	Sales (decrease) June 2020			Employment (decrease) June 2020		
	(1)	(2)	(3)	(4)	(5)	(6)
Variables in tax administrative and survey data						
Activity[1]						
Retail	−0.0365	−0.0292	−0.0136	−0.0155	−0.00484	−0.0327
	(0.105)	(0.105)	(0.0812)	(0.0925)	(0.0887)	(0.0861)
Other	0.0328	0.0128	0.0350	0.0357	0.0154	−0.0270
	(0.0514)	(0.0560)	(0.0540)	(0.0823)	(0.0674)	(0.0758)
Size[2]						
Medium	0.0360	0.0143	0.0368	0.111	0.0947	0.0720
	(0.0553)	(0.0576)	(0.0519)	(0.0764)	(0.0673)	(0.0713)
Large	−0.0770	−0.0978	−0.0670	0.0216	0.0541	0.0707
	(0.0737)	(0.0782)	(0.0778)	(0.0689)	(0.0769)	(0.0831)
Lusaka	−0.0367	−0.0476	−0.0114	0.00471	−0.0549	−0.0918
	(0.0463)	(0.0486)	(0.0483)	(0.0719)	(0.0570)	(0.0615)
Firm age	−0.000899	−0.000316	0.00002	0.00385	0.00514	0.00429
	(0.00204)	(0.00280)	(0.00268)	(0.00335)	(0.00315)	(0.00320)
Other baseline survey characteristics						
Manager experience		−0.00165	−0.00175		−0.00241	−0.00283
		(0.00287)	(0.00271)		(0.00325)	(0.00331)
Competitive market		0.0114	0.00144		0.0842	0.114
		(0.0483)	(0.0474)		(0.0738)	(0.0747)
Introduced new products		0.0267	0.0362		−0.172***	−0.208***
		(0.0503)	(0.0504)		(0.0544)	(0.0566)
Limited finance		0.0249	0.0157		0.0942	0.141*
		(0.0531)	(0.0496)		(0.0769)	(0.0791)
Trained employees		0.0856	0.0828		0.0523	0.0408
		(0.0525)	(0.0504)		(0.0820)	(0.0833)
Information from follow-up surveys						
Changed practices			−0.0975*			0.00701
			(0.0499)			(0.0772)
Receive gov. support			−0.270			0.318
			(0.249)			(0.256)
Observations	514	514	514	578	578	514

Note: this table is based on Equation (1). * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. [1] The omitted category is *manufacturing*. [2] The omitted category is *small*. *Manager experience:* defined as the number of years of experience of the top manager in the firm. *Competitive market:* dummy variable for whether a firm has had more than five competitors enter their market in the previous two years. *Introduced new products:* dummy variable for whether a firm introduced new products in the previous three years. *Limited finance:* dummy variable for whether a firm stated that access to finance was a very severe or major obstacle for their business. *Trained employees:* dummy variable for whether a firm stated that they offered their permanent employees training. *Changed practices:* dummy variable for whether a firm changed their business operations in response to the COVID-19 pandemic. *Receive gov. support:* dummy variable for whether a firm received some kind of cash support from the government to help deal with the impact of the pandemic.

Source: authors' compilation based on survey and tax data.

Table B2: Factors associated with a recovery in sales and employment

	Sales (increase) July 2021			Employment (increase) July 2021		
	(1)	(2)	(3)	(4)	(5)	(6)
Variables in tax administrative and survey data						
Activity[1]						
Retail	−0.213***	−0.218**	−0.227**	0.00266	−0.0318	0.0113
	(0.0819)	(0.0873)	(0.0885)	(0.105)	(0.102)	(0.118)
Other	−0.130*	−0.161**	−0.167**	−0.185***	−0.179**	−0.207***
	(0.0751)	(0.0710)	(0.0715)	(0.0708)	(0.0715)	(0.0746)
Size[2]						
Medium	−0.0210	−0.0465	−0.0518	−0.0130	−0.0133	0.0763
	(0.0715)	(0.0644)	(0.0663)	(0.0729)	(0.0722)	(0.0673)
Large	0.137*	0.0955	0.0879	−0.0228	−0.0264	−0.0157
	(0.0817)	(0.0844)	(0.0872)	(0.0733)	(0.0781)	(0.0633)
Lusaka	0.0617	0.0755	0.0817	−0.136*	−0.140*	−0.0763
	(0.0689)	(0.0715)	(0.0709)	(0.0737)	(0.0723)	(0.0805)
Firm age	−0.00103	−0.00495	−0.00510	−0.00483*	−0.00828***	−0.00722**
	(0.00294)	(0.00325)	(0.00338)	(0.00267)	(0.00313)	(0.00308)
Other baseline survey characteristics						
Manager experience		0.00697*	0.00709*		0.00752**	0.00792**
		(0.00395)	(0.00416)		(0.00337)	(0.00346)
Competitive market		−0.143**	−0.145**		−0.0229	−0.0289
		(0.0698)	(0.0726)		(0.0659)	(0.0655)
Introduced new products		−0.0520	−0.0533		−0.0130	0.0615
		(0.0664)	(0.0679)		(0.0740)	(0.0779)
Limited finance		0.0247	0.0256		0.0415	0.0343
		(0.0697)	(0.0705)		(0.0723)	(0.0717)
Trained employees		0.0799	0.0828		−0.0602	0.0362
		(0.0670)	(0.0712)		(0.0763)	(0.0721)
Information from follow-up surveys						
Changed practices			−0.0110			−0.0624
			(0.0721)			(0.0747)
Receive gov. support			0.0440			0.562***
			(0.198)			(0.166)
Observations	448	448	434	578	578	434

Note: this table is based on Equation (1). * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. [1] The omitted category is *manufacturing*. [2] The omitted category is *small*. *Manager experience:* defined as the number of years of experience of the top manager in the firm. *Competitive market:* dummy variable for whether a firm has had more than five competitors enter their market in the previous two years. *Introduced new products:* dummy variable for whether a firm introduced new products in the previous three years. *Limited finance:* dummy variable for whether a firm stated that access to finance was a very severe or major obstacle for their business. *Trained employees:* dummy variable for whether a firm stated that they offered their permanent employees training. *Changed practices:* dummy variable for whether a firm changed their business operations in response to the COVID-19 pandemic. *Receive gov. support:* dummy variable for whether a firm received some kind of cash support from the government to help deal with the impact of the pandemic.

Source: authors' compilation based on survey and tax data.