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Watts happening to work? The labour market effects of loadshedding

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Expanded access to electricity has been a boon to development in many low- and middle-income countries, including South Africa, but erratic supply has proved a major constraint to economic growth. Now, in the first study on the effects of load-shedding on employment, the authors find that prolonged and regular power outages are significantly and negatively associated with job retention, working hours, and earnings.

Access to electricity in low- and middle-income countries has improved significantly in recent decades, reaching 90% of the population in these countries by 2021. However, while expanding access is necessary to achieve meaningful gains in several development outcomes, access alone is insufficient. In many of these countries, factors such as inadequate generating capacity, infrastructure investment, and high energy prices mean that electricity supply is often highly unreliable. Frequent and long-lasting outages serve as the consequence. By forcing households and firms to maintain a stock of alternatives, such as diesel generators and back-up batteries, these outages raise the private and social costs of energy services and, hence, hinder the benefits of improved access.

Power outages have long been identified as a major constraint to economic growth in lower-income countries. Many studies document their negative effects on various outcomes such as economic growth, firm productivity, and sales. It is unsurprising then that the estimated demand for electricity reliability, as measured by the willingness to pay to avoid outages, in such contexts is relatively large. Given these effects, and the relationship between economic output and employment, outages are expected to also significantly affect labour market outcomes. These effects are of particular interest given the labour market's central role in determining socio-economic wellbeing globally. This is especially the case in high-unemployment contexts, such as South Africa, where decent employment generation is key to achieving meaningful poverty alleviation. We consider this very question and analyse the labour market effects of electricity outages in South Africa in a recently released paper supported by the United Nations University World Institute for Development Economics Research (UNU-WIDER).

While boasting almost universal access, over the past 15 years South Africa has been subjected to rotational, scheduled outages referred to as load shedding. Load shedding is primarily a consequence of frequent breakdowns at the national utility due to a combination of poor long-term planning, a lack of financial resources, rampant state capture and corruption, and aging coal-fired power stations – 80 per cent of which have surpassed their mid-life cycle. These outages have become significantly more frequent and severe in recent years. In 2008, when about 85 per cent of generation capacity was available, just 171 megawatts (MW) of demand were unmet or 'shed' in the average day, compared with more than 4,000 MW of unmet demand in 2023 – the worst year on record – when just 50 per cent of generation capacity was available. Put differently, in 2023 load shedding was in place for a total of 289 complete days. Several studies find that these outages reduce economic growth. To our knowledge, though, there has been no empirical evidence of their labour market effects until now.

We model the labour market impacts of load shedding in South Africa using more than 15 years' worth of nationally representative labour force survey data, covering nearly 3 million individuals, merged with macroeconomic data and high-frequency electricity data from 2008 to 2023. We consider impacts in three distinct ways. First and simply, in a binary sense that compares labour market outcomes between periods of load shedding versus no load shedding. Second, in a continuous sense to account for differences in load-shedding intensity over time, as measured in MW of unmet demand. Third, because load shedding is implemented in 'stages' – for instance, stage 1 refers to up to 1,000 MW of unmet demand and stage 6 up to 6,000 MW – we measure load shedding in a categorical sense to examine differences in effects between different stages. We focus on effects on employment, working hours, hourly wages, and monthly earnings, and also consider how effects vary across firms of different sizes and in different industries. We adjust all our models to ensure that the measured impacts are not driven by a series of other factors, such as dynamics during the COVID-19 pandemic period, seasonality, or changes in macroeconomic conditions relating to gross domestic product (GDP), the interest rate, exchange rates, and investment.

We find that load shedding is significantly and negatively associated with employment, working hours, and monthly earnings. On average, periods of load shedding are associated with a 2.6 per cent lower chance of being employed, 1.3 per cent fewer working hours per week (equal to about half an hour on average), and 1.7 per cent lower real monthly earnings. These are large, non-negligible effects. We do not find evidence of a relationship with hourly wages, which suggests that the monthly earning reductions are driven by fewer working hours. Importantly, all these associations are not evident for low levels of load shedding but tend to become markedly worse with higher levels. We do not find any evidence of negative associations for stages 1 and 2, but from stage 3 upwards, we show that the average negative association becomes significant and stronger. For employment, for instance, stage 3 is associated with 1.9 per cent lower employment, compared with 3.6 per cent for stages 4 and 5 and almost 6 per cent for stage 6 – more than double the average association.

These effects do not, however, affect all firms equally. Manufacturing – a relatively energy-

intensive sector – appears particularly vulnerable. On average, load shedding is associated with nearly 17 per cent lower manufacturing employment, which is about 6.5 times larger than the average. Reductions in working hours for workers in most industries are evident.

By firm size, workers in large firms appear vulnerable with respect to all outcomes. In contrast, those in small firms were vulnerable only to (larger) reductions in working hours, but not to job losses or earnings cuts. These latter results suggest then that small firms tend to favour reducing working hours rather than introducing layoffs, a finding that is not unique to South Africa. The former results may seem counter-intuitive given that one might expect larger firms to be less vulnerable due to, for instance, more resources that allow them greater ability to access alternative energy sources. While that's probably true, large firms are significantly more likely to operate in energy-intensive sectors.

Overall, then, our analysis reveals three key sets of results. First, load shedding in South Africa has negative labour market effects on both the extensive margin – employment – as well as the intensive margin – working hours and monthly earnings. Effects on employment are, however, larger than effects on working hours or earnings on average, highlighting the threat that load shedding poses to job preservation and creation efforts. Second, these effects are not distributed equally across firms, with those in energy-intensive manufacturing appearing particularly vulnerable. Third, effects are non-linear with respect to load shedding intensity. In other words, the labour market appears to be largely insensitive to relatively low levels of load shedding; however, high levels are particularly costly. Importantly, the lack of effects for low levels neither implies that they should be tolerated nor that they do not cause negative effects elsewhere, as is evident from other studies that reveal significant negative effects on non-labour market outcomes.

These results highlight the significant negative effects of load shedding on the real economy. From a policymaking perspective, while support to firms and households - such as tax breaks or provision of back-up batteries to businesses by municipalities -should continue to be considered, the primary goal must be to rapidly reduce both the frequency and intensity of these outages and, ultimately, eliminate them. Recent events are encouraging. Efforts by the national utility have resulted in fewer breakdowns and improved generation capacity, while deregulation and tax incentives appear to have increased demand from households and firms for alternative energy sources like solar. Consequently, electricity supply has been uninterrupted for about two months.[1] However, there is still considerable instability in the system and supply is expected to remain constrained in the medium-term.

Longer-term policy decisions need to focus on further diversifying the energy mix beyond coal, accelerating the transition towards renewable energy sources, incentivising private investment and, overall, building a more resilient and sustainable energy system.

[1] There was a widespread popular narrative that loadshedding had been reduced due to the May elections, but the reduction appeared to be due to reduced demand, possibly because of increased use of solar and low economic growth, as well as to improved supply.