



**FUTURE
OF WORK
IN THE GLOBAL
SOUTH**

AUTOMATION | SUB-SAHARAN AFRICA

Does technological growth destroy jobs and exacerbate wage inequality in middle-income countries?

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1. Executive Summary

This policy brief summarises findings from a research paper on changes in the South African labour market over the period 1997 to 2015. Specifically, we investigate whether the South African labour market experienced the same “hollowing out” or polarisation due to technological change as developed countries, whereby the share of middle-skilled (and highly routinised) jobs decreased, resulting in relative increases in both low- and high-skilled jobs. We find evidence that this did occur, and that there were differences in the movement of workers by race and gender. Importantly, we find that black workers and women were more likely to move to low-skilled occupations, while workers from the other race groups and men were more likely to move into high-skilled jobs. We interpret this as the result of apartheid-era labour market discrimination, a schooling system which fails to transfer adequate skills to black learners, and persistent discriminatory practices and structural inequalities by race and gender.

2. Research overview

Technological change has important impacts on the labour market. One of these is that new technologies can increase the wages for some occupation and skill groups, while decreasing wages for others. For example, since the 1970s new technologies have generally favoured higher-skilled workers, so their relative demand (and wages) increased, while the demand for (and the wages of) lower-skilled workers decreased. This form of technological change that caused an increase in the demand for higher-skilled workers is called skill-biased technical change (SBTC).

Existing evidence indicates that the adoption of such technologies disproportionately benefitted those with middle to advanced levels of education at the expense of those with less education. This had negative implications for labour markets with high concentrations of unskilled workers, as it pushed down the wages of unskilled workers and made it difficult for them to find jobs. However, this hypothesis did not predict the more recent phenomenon observed across several developed countries' labour markets of shrinking employment shares and slower wage growth for *middle*-skilled workers. To explain this phenomenon, labour economists put forth a theory that explains changes in the labour market due to technological change as the result of not just the skills levels required for different jobs, but also the level of routinisation that a job entails. According to the theory (called routine-biased technological change (RBTC)), jobs that involve many routine tasks are easier to automate with technological developments, and so those are the jobs that are replaced with new technology. Existing evidence indicates that it is in fact middle-skilled jobs that are most routinised, since low-skilled and high-skilled workers alike perform a larger share of non-routine manual or cognitive tasks, both of which are harder to automate and replace with technological developments.

While we have ample evidence of the impact of RBTC on the labour markets of developed countries, evidence from middle-income countries is limited. Our research therefore aimed to investigate whether the theory of RBTC can help us understand South African labour market trends between 1997 and 2015. To do so, we use three sources of data (the October Household Surveys (OHS) (1994-1999), the bi-annual Labour Force Surveys (2000-2007), and the Quarterly Labour Force Surveys (QLFS) (2008-2017) and classify the skill levels of occupations using the United Nations' International Standard Classification of Occupations.

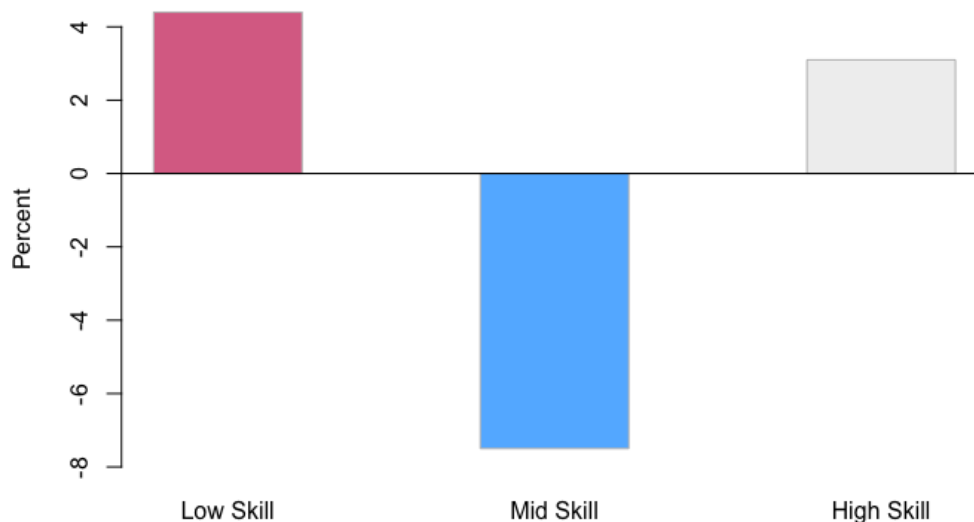
To measure the level of routinisation in an occupation, we make use of survey data from the World Bank's Skills Toward Employment and Productivity (STEP) measurement programme, which contains data on the tasks that workers in developing countries perform on their job. For each occupation, we measure the importance of four different types of tasks, and we construct a summary measure of the occupation's routine task intensity, the Routine Task Intensity (RTI) index. The RTI index measures the level of routinisation in an occupation.

3. Research findings

Trends in the shares of low, middle, and high-skilled workers

Our findings point to evidence of the “job polarisation” – whereby middle-skilled, highly routinised jobs are replaced by technology while the demand for low- and high-skilled non-routinised jobs increases – in the South African labour market during the period 1997 to 2015. That is, over this time period the labour market saw increases in the share of low- and high-skilled workers and a decline in the share of middle-skilled workers (Figure 1). Further analysis confirms that occupations with higher routine task intensity were more likely to decline. This is exactly what we would expect to see if RBTC is causing the automation of routine tasks previously performed predominantly by workers in middle-skilled occupations.

Figure 1. Private sector changes in occupational employment shares among working age adults (1997-2015)

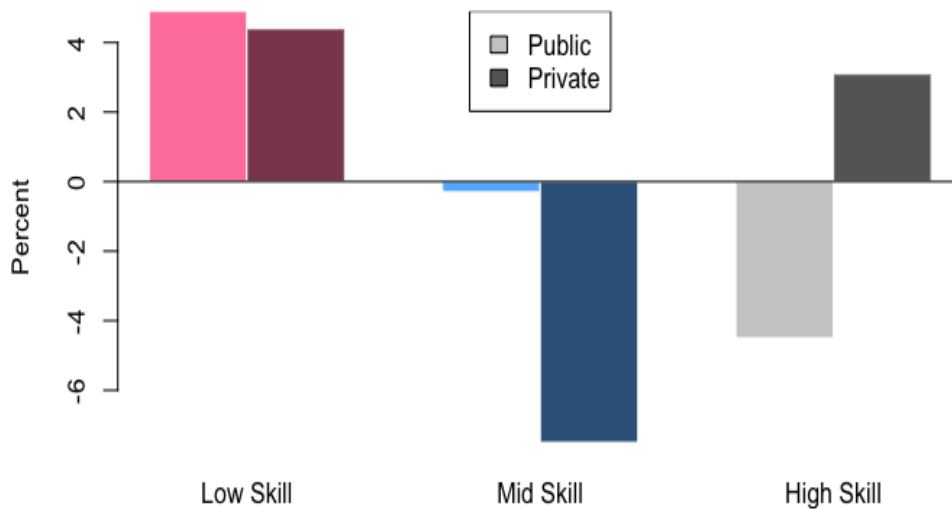


Source: Authors' elaboration.

Unlike the evidence from most developed economies, we find that the job losses in middle-skilled occupations are offset mainly by relative increases in the share of low- rather than high-skilled occupations. That is, while in advanced economies the disappearance of middle-skilled occupations is associated with movement toward more skilled jobs, in South Africa most middle-skilled workers move toward *less* skilled jobs.

Splitting occupations by private/public, we find that the effects of RBTC appear to be limited to the private sector where employment decisions depend more on worker productivity than in the public sector.

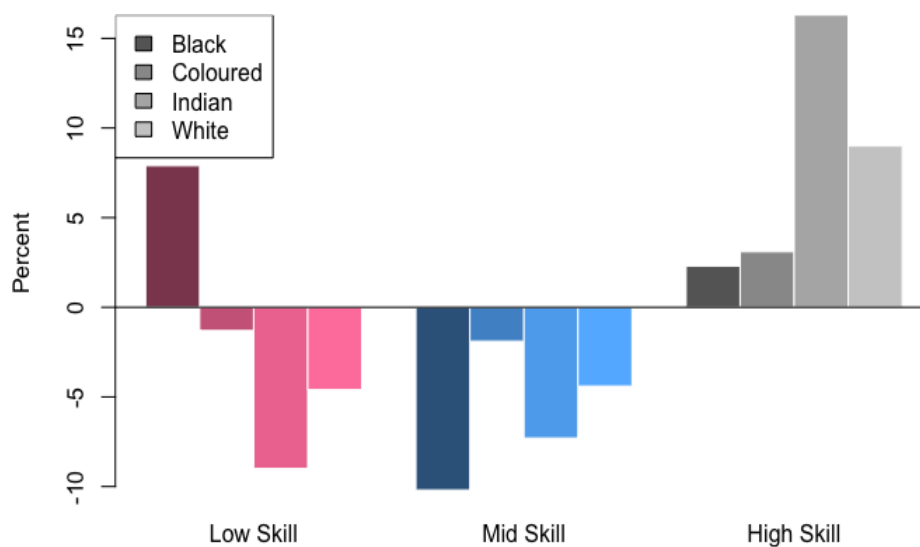
Figure 2. Changes in employment shares in the private and public sector (1997-2015)



Source: Authors' elaboration.

Interestingly, we also find evidence to suggest these movements are differentiated by race and gender. Importantly, we find that the effect whereby middle-skilled workers move toward low-skilled jobs (instead of high-skilled jobs, as expected) is concentrated among Black individuals, while White, Coloured, and Indian people tended to move from middle-skilled to high-skilled occupations (Figure 3). We find similar trends by gender, with the number of women in low-skilled occupations growing over the period, while the number of men in high-skilled occupations increased. We posit that these increases in low-skilled work for black workers may point to some enduring effects of apartheid, such as the dysfunctional schooling system that serves predominantly black learners and does not transfer adequate skills to learners, thereby having long-term productivity effects. We may also be seeing the result of entrenched discriminatory hiring and firing practices which create and reinforce social spheres where white male workers have access to powerful networks that are not available to black and female workers. Consequently, as production processes become increasingly skills-biased leading to the sharp decrease in middle-skilled jobs, black workers and women find themselves being relegated to low-skilled occupations instead of being able to adjust to the requirements of high-skilled jobs.

Figure 3. Private sector changes in occupational employment by race (1997-2015)



Source: Authors' elaboration.

Furthermore, we find that jobs that involve a high share of routine tasks – whose workers happen to be those in the middle of the skills distribution – experienced a decline in employment and wages over time.

Trends in wages

Given these changes in the employment shares of workers with different skills levels, we would expect wages to reflect these changes in the relative demand of different types of occupations. Specifically, if the demand for middle-skilled workers is decreasing, we would expect to see a decrease in the relative wages of these workers. Our results show that while there was a large relative wage increase among high-skilled workers, as RBTC predicts, low-skilled workers did not experience a relative rise in wages. We attribute this to both the high unemployment rate among unskilled workers in South Africa, and the fact that wages for low-skilled workers are partly determined by institutional (that is, non-market) factors, such as minimum wage laws.

4. Conclusions

If these observed trends persist over time, it is likely that wage inequality will become further exacerbated in the South African labour market. In addition, since we observe differential trends by race and gender, this further exacerbation would disproportionately affect already disadvantaged groups, including women and black workers.